POPULAR AVIATION

Combined With

Aeronautics

A magazine for everyone interested in Gliders—Lightplanes—Models

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The Rescue *of*

An Epic of the War

by

JAMES M. RICHARDSON

Lieut., 1st Squadron; Holder of Distinguished Service Cross.

Illustrated by Herman R. Bollin

"For the third time the plane flashed through the ravine—Bullets whined by the airmen's ears — If only they could spot the Lost Battalion!"

THERE was no hint of the impending tragic events that were to befall him when on October 2, 1918, Major Charles W. Whittlesey of the 77th Division, A. E. F., received this laconic order:

"The advance will be resumed on 'D' day at 'H' hour. Your objective is the line 294.5-276.6. *You will take your objective and hold it at any cost until support arrives."*

Word of the impending attack spread rapidly through the ranks of the 77th Division. In an undemonstrative manner they prepared to go over the top. What was another attack to men who had been through seven days of the bitterest fighting of the war! Who had struggled desperately for every inch of ground they had gained!

The 77th Division had the tortuous wilderness of the Argonne Forest itself —one of the toughest sectors ever given any body of troops. No terrain could be better adapted to resistance, and the Germans had taken full advantage of it. Their carefully concealed machine gun nests made progress for the Americans a matter of overwhelming numbers rather than of artillery or strategy.

Following a short but intense barrage the first wave of the 77th crept forward shortly after noon. On every foot of the line they encountered a deluge of machine gun fire. Again and again they launched savage thrusts only to meet enemy resistance that checked them.

But at one place the Americans finally crashed through. They broke the defense in the sector of the 308th Infantry, and units of that regiment with a part of the 306th Machine Gun Battalion penetrated the German lines by advancing up a small valley. At sundown this small force reached the Binarville-Apremont highway and established themselves below the road on the northern slope of a bleak ravine.

Late that evening a single company of the 307th Infantry fought its way forward and joined them. Soon thereafter it was discovered that both flanks were exposed. The troops on each side had failed to advance!

But Whittlesey's orders were to hold his objective at any cost, and hold it he did while the German army pushed troops in behind and cut him and his men off from the main body of the 77th Division.

By noon of October 3 this small group of men, known as the Lost Battalion, was completely surrounded. Behind the little force, entrenched on the other side of the ravine, was a powerful German detachment.

the Lost Battalion

The most stirring tragedy of the World War. Six hundred men, cut off from their own troops, found themselves surrounded by the enemy forces. Without food, without ammunition, the "lost battalion" spurned surrender. The frantic aerial search for the doomed men, and finally their rescue, is a glorious page in America's history.

There were two machine gun nests on each side of the Americans and to the rear. There was another machine gun on an eminence to the right. The main German army with flame throwers and trench mortars lay on the heights above them.

Thus surrounded and cut off from the main body of American troops, this courageous little band of fighters lay trapped but defiant and ready to hold out to the last man.

THE fight of the Lost Battalion is one of the most heroic in American military annals. It is reminiscent of the Alamo and of Custer's last stand. The Americans were subjected to constant machine gun and minenwerfer fire. They had to beat off numerous attacks. But for five days they stuck it out, more than a mile ahead of the division front lines.

The men had no blankets, insufficient ammunition and no food after the second day. Such water as they got came from muddy Charlevaux creek, exposed to deadly machine gun fire.

The position occupied by the Lost Battalion was a narrow strip of ground about 350 yards long and less than 50 yards wide. It lay on an east and west line on the north side of the ravine.

But Major Whittlesey unfortunately had difficulty in orienting himself exactly, and in all the messages sent back by carrier pigeon, he gave his location inaccurately. According to the coordinates he used, his position should have been slightly behind and to one side of what it actually was.

The 50th Observation Squadron, stationed at Remicourt, was attached to the 77th Division for the early part of the Argonne drive. On the day it became definitely known that Whittlesey's battalion was cut off and surrounded, the squadron sent four courier planes to drop messages at the point where the beleaguered infantry were supposed to be.

On this and the following day, October 5, a generous supply of chocolate and cigarettes was dumped with every message. Though the airmen were unaware of it at the time, everything that was dropped fell into the Germans' hands. This was the direct result of having inaccurate information as to the battalion's true position, but certainly it was nothing like so terriible as what came later.

American artillery, guided by the same inaccurate coordinates, began to shell what they believed to be the German positions but actually their shells fell on the surrounded men! At 4:15 P. M. on October 5 Whittlesley sent a message to the rear by his last courier pigeon. It read:

To: C. O. 308th Infantry.

From: 1st Br., 308th Infantry.

We are along the road parallel 276.4. Our artillery is dropping a barrage directly on us. For heaven's sake stop it.

(Signed) Whittlesey, Major 308th.

This message drove the division to redouble their efforts to rescue the Lost Battalion. They attacked furiously just before dark but were repulsed by the Germans along the entire front.

At the 77th Division headquarters a few hours later the officers decided to ask for planes of the 50th Squadron to drop food, ammunition and medical supplies to the surrounded men. And it was from this point that the air service really began to play a prominent part in the relief of the Lost Battalion.

In that bloody angle of the Argonne Forest near Charlevaux Mill airmen wrote one of the brightest pages in air service history. That the results they produced were not more tangible is surely no reflection on their colossal courage and their glorious enthusiasm.

OCTOBER 6 is a day that few of us stationed at Remicourt will ever forget. To begin with the weather was miserable. A damp mist swirled in from the north and covered the field like a drab blanket. Both airmen and mechanics were tense with excitement.

Though little was said of the terrible plight of the Lost Battalion, still it was in everybody's thoughts. To think of five or six hundred men cut off for over three days without food or ammunition, with their condition growing worse hourly! We conjured some dreadful pictures of their suffering, but certainly none were as bad as reality.

At the airdrome mechanics had worked faithfully throughout the night to have every plane in the best condition. Others had wrapped food, ammunition and medical supplies into convenient bundles. They had attached small parachutes to the carrier pigeon baskets "to insure a fairly soft landing for the imprisoned birds." Those charged with doing the flying were full of determination. Anxious to be off, now that day had come, they strode restlessly about the flying field.

One of the first planes to leave was flown by Lieutenant Harold Goettler. His observer was Lieutenant Erwin

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Bleckley. Their De Haviland looked like a lean grey ghost as it roared off the field and turned north into the devouring mist.

In a few minutes Goettler and Bleckley watched Saint-Menehould slide back beneath their wings. With the Argonne Forest on their right, they headed for Vienne-le-Chateau. As they flew nearer and nearer their objective, they could see flashes below like dull points of flame—the artillery.

Over Binarville Goettler turned northeast and sped directly across the lines towards Charlevaux Mill. On the side of the ravine, 400 yards east of Charlevaux Mill, lay the Lost Battalion.

Goettler was an experienced pilot. He had flown over the 77th Division daily and knew the terrain thoroughly. He realized immediately that he and Bleckley would never be able to find their objective from 1,000 feet. At this particular point the Argonne was shrouded in the interminable fog and mist. From the airmen's height objects on the ground were as effectively hidden as they would have been by darkness.

"No use wasting time at this altitude. We have to get down lower if we're going to spot them," shouted Goettler through the speaking tube to Bleckley.

Bleckley nodded. Goettler slowed down the motor. The D. H.-4 sank rapidly through the mist—500 feet—400—300 feet—then barely 200.

Suddenly the American plane darted out of the protective grey fog. Immediately a storm of rifle and machine gun fire met it. Goettler could hear the spiteful crackle even after he opened the powerful Liberty motor on full.

The airmen were down in the ravine now. The German troops on the heights north of the Lost Battalion were actually higher than the plane! The Americans raced over Charlevaux Mill peering below for any trace of the lost men.

The trees beneath them and on each side they could see plainly now for this wasn't the blasted region that the Argonne was further south. The woods here had suffered little from artillery fire, and they offered perfect protection to soldiers on the ground.

The machine gun and rifle fire grew in volume. Bullets whined by the airmen's ears. Bleckley grabbed his own machine guns. He stared over the side of the cockpit. If only he could spot one of those Germans—. Or, better still, if only he could spot the Lost Battalion.

Twice he shot his Very pistol in the hope that Whittlesey's men would get his rocket signal and show a panel. They didn't show one or themselves either. Any movement on their part meant sudden death from snipers.

For the third time the plane flashed through the ravine. The enemy fire was growing more terrible each second. A bullet splintered a strut by Goettler's head. Another hit Bleckley's guns and ricocheted into space. Now one tore through the fuselage ahead of Goettler and took a section of fabric with it.

Under the trajectory of the shells! On top of the machine guns! Only those who have threaded their way among those messengers of death can know what anxious seats Goettler and Bleckley had. Or can appreciate their courage.

On this round Bleckley realized that he must act now. He held his bundles over the side. He watched the ravine unfold beneath them. Yes, there was the spot where the Lost Battalion was supposed to be. And nobody had learned anything to the contrary. He dropped the bundles as Goettler turned the DH and headed for home.

Back at Remicourt we marvelled at the condition of Goettler's plane. Over forty bullets had struck it, but not one in a vital spot.

SHORTLY before noon on the same day Lieutenant Floyd Pickerell, pilot, and Lieutenant Alfred George, observer, set out with another load of supplies. The visibility was better for the moment, but George was unable to check the location of the Lost Battalion. He was finally forced to do as Bleckley had done earlier: drop his bundles at the bottom of the ravine.

MAJOR CHARLES W. WHITTLESEY,
Commander of the Lost Battalion

Whittlesey received the Congressional Medal of Honor—

"For conspicuous gallantry and intrepidity above and beyond the call of duty in action with the enemy northeast of Binarville, in the Forest d'Argonne, between Oct. 2 and Oct. 7, 1918. Although cut off for five days from the remainder of his division, Major Whittlesey maintained his position, which he had reached under orders received for an advance and held his command, consisting originally of 463 officers and men of the 308th Infantry and of Co. K of the 307th Infantry, together in the face of superior numbers of the enemy during the five days.

"Major Whittlesey and his command were thus cut off and no rations or other supplies reached them, in spite of determined efforts which were made by the division. On the fourth day Major Whittlesey received from the enemy a written proposition to surrender, which he treated with contempt, although he was at that time out of rations and had suffered a loss of about 50 per cent in killed and wounded of his command and was surrounded by the enemy."

One of the first pilots to go over in the afternoon came back with a bullet through the sole of his shoe. It was soon evident that the Germans had concentrated a formidable array of machine guns and rifles to cope with our planes.

As machine after machine went over them, all headed for the same spot, the enemy were entirely correct in assuming that the Americans were determined to succor the Lost Battalion at any cost.

But as the German resistance stiffened, the 50th Squadron members just as promptly became bolder.

Lieutenant George Phillips and Lieutenant Michael Brown were among the first to dare the reinforced aerial defenses of the enemy. Swooping from the clouds, they swept in over Binarville and headed for the objective. The bullets hissed about them with a vengeance. One passed through the windshield. Another crashed into the altimeter. Then there was a dull thud! The motor stuttered and gasped. In a moment it died completely!

Like a flash Phillips whirled for home. He was only 250 feet high and over the enemy lines. If he made No Man's Land, he would be lucky. The De Haviland sank rapidly, accompanied by the most hellish din that Phillips and Brown had ever heard. Scores of machine guns and thousands of rifles were shooting at the luckless pair.

Phillips held the nose of his plane up as long as he dared. It barely cleared a barbed wire entanglement. The nose went down. The ship settled fast. It hit, bounced and ended in a shell hole. In a rain of bullets the two Americans leaped out and reached our lines.

Scarcely an hour later Lieutenant Allen Bird and Lieutenant William Bolt were caught in another destructive wave of enemy fire from the same source. Bird skidded his plane, he changed directions, but to no avail. The Germans shot his machine out of commission, and he crashed near Vienne-le-Chateau. Fortunately neither he nor Bolt was hurt.

Back at Remicourt we were alarmed. Two machines had failed to return. Having no news from the occupants of the machines, we feared they had been killed.

That was the way things stood when Goettler and Bleckley pulled on their flying suits and took the next mission. Yes, they had been through that inferno of fire once. Yes, the last two planes had failed to return. But what of it!

As Goettler said, he and Bleckley weren't quite satisfied with the way they had dropped their first load of supplies. This trip they meant to go

(Continued on page 62)

This Wins the Booby Prize

DON BRIDIE, Oklahoma City aviator, believes he has achieved a new kind of an air record when he recently found it necessary to take seven and one-half hours to fly 15 miles. During this time he made seven forced landings without scratching wing tips or fuselage. Here's how it happened:

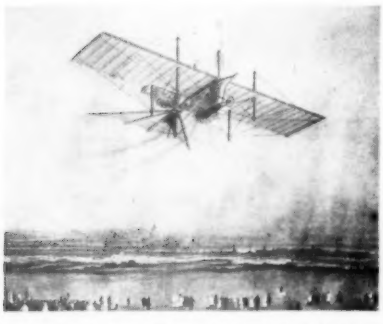
The plane in question had been left overnight in an oil field south of Oklahoma City. During the night a pair of mules, liking the banana oil flavor, chewed off half a yard of the stabilizer.

Bridie was given the job of flying the ship back to the home port for repairs. He traveled about half a mile when the motor "conked." He landed and found water in the carburetor. He fixed that. Next the radiator boiled over and water drowned the motor. Another landing. Other forced landings delayed him in reaching the airport until 4:30 o'clock that afternoon, although he had started at 9 a.m.

Aircraft in 1846

ON the walls of the Franklin Institute, in Philadelphia, hangs this print of the "Aeriel," an aeroplane built in England in 1846. The artist was as enthusiastic as the builder, it appears, for the plane never flew.

At the time of the "Aeriel" there was considerable air-mindedness in England, however, and Sir George Cayley wrote to the Franklin Institute in 1843: "I think it a national disgrace in these enlightened locomotive times not to realize by public subscription the proper scientific experiments, necessarily too expensive for any private purse, which would secure to this country the glory of being the first to establish any navigation of the universal ocean of the terrestrial atmosphere."



An artists conception of what the "Aerial" would look like.

It will be seen from a glance at the print that much of the design, especially of the wings, was on the right track. The power plant was the great drawback, crude steam engines being the only known medium at the time. The ideal was considered an engine weighing six hundred pounds that could develop 20 horsepower and a speed of thirty miles an hour was predicted.

The 1931 Model Gee Bee Sportster

THIS is the very latest 1931 model Gee Bee Sportster.

The wheel pants and streamlined landing gear struts mark the most noticeable refinement over the previous model of the sportster which gained wide recognition as a fast and maneuverable plane.

As shown here, the Gee Bee is powered with a 110 h. p. Warner Scarab engine. This model may also be powered with three other engines: the 95 h. p. or 125 h. p. Menasco or the 135 h. p. Fairchild.

The Sportster is a tiny ship, having a span of only 25 feet and a length of 17 feet 3 inches. It is 6 feet high and has a fuel capacity of 40 gallons and an oil capacity of 3 gallons.

Powered with the Warner engine, the plane has a weight of 910 pounds. Its top speed is 145 m. p. h.; crusing speed, 125 m. p. h.; and landing speed, 50 m. p. h. From a standing start it will climb to 5,000 feet in 4½ minutes.

The price of the Gee Bee Sportster varies from $4,780 to $5,580, depending on the engine installed.

Granville Bros. Aircraft, Inc., manufacturers of the "Sportster," are planning a larger model to be known as the "Senior Sportster."

It is of the same general design and appearance as the smaller plane, but will be a two place job powered with a P. & W. Wasp Junior engine.

Globe Circling Tour Planned

AROUND-THE-WORLD in ten days, to break the record of the Graf Zeppelin, is the flight planned to start shortly after May 1 by Wylie Post, who won first place in the Los Angeles to Chicago speed event of the National Air Races last year.

F. C. Hall, Oklahoma oil man, is sponsoring the flight, as he did Post's entry in the national races.

The plane which Post will use in the flight will be the same Lockheed in which he won the National Air Races.

Harold Gatty of Los Angeles, Calif., who made the start with Bromley from Japan to the United States in a proposed eastward flight across the Pacific last fall, will act as navigator for Post.

Post first planned to make the flight with a robot, or mechanical pilot, as a flying companion and he still is making tests along that line.

The route mapped by Post for the flight will include only about 1,940 miles of over-water flying, the total distance being 16,067 miles. Each of the hops will be within easy cruising range of the plane with its additional fuel storage space, Post says.

Post plans to fly "blind" during most of the trip, starting each day's flight after noon and flying through the night to land the next morning.

New Fluid Prevents Engine Troubles

IN THE event of war, Uncle Sam's Army and Navy air fighters will have a decided advantage over enemy flyers because of a mysterious new fluid that protects motors against loss of lubrication and greatly increases the flying range of planes. This is the statement of several St. Louis engineers.

These authorities point out that during the World War many planes were destroyed because of motors becoming jammed from lack of lubrication when their oil tanks were pierced by bullets.

These hazards may be practically eliminated by a new liquefied colloidal graphite fluid, which tests show establishes a lubricating surface over metal bearings that is impervious to heat, cold or dilution. Motors so protected may be driven long distances absolutely without lubricating oil.

Thus in case a plane's oil tank is punctured by gun fire and completely drained, the indestructible graphoid lubricating film produced by this fluid would still permit the pilot to fly many miles to safety before any signs of motor trouble from loss of lubricating oil would develop.

The Army Air Corps is now making tests with this fluid in airplanes at Wright Field, Dayton, Ohio, and the Navy is arranging to do likewise.

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Mattley "Flivver Plane" is Introduced

Two views of the new "flivver" showing the cabin type construction and the wide undercarriage.

THE first "flivver plane" to be manufactured in the West recently passed successful flight tests at San Francisco.

The Mattley "Flivver Plane" is one place monoplane capable of carrying a second passenger. The fuselage is a semi-monocoque cabin type.

On its tests, the plane performed well, taking off in 300 feet and landing in less than 30 feet. It can be flown at a fuel cost of about three quarters of a cent per mile.

The plane was engineered under the requirements of the Department of Commerce and arrangements are being made for an Approved Type Certificate.

Powered with a Continental A-40 engine, the Mattley "Flivver" is priced at $1,290 at the factory. Its performances follow:

Wing span	35 ft.
Wing cord	5 ft. 6 in.
Length	20 ft. 8 in.
High speed	70 M. P. H.
Cruising speed	45 to 50 M. P. H.
Landing speed	24 M. P. H.
Ceiling	12,000 ft.
Climb	450 ft./min.

"Me and My Shadow"

WE OFTEN hear of people who are afraid of their own shadows, but one would hardly think of an aviator being scared of his own shadow, or rather that of his own plane. But such a thing happened once to Lieut. Charles Carroll Greene, army reserve flyer, of Medford, Mass.

"Flying contains an element of novelty that will not let monotony linger for long," he says. "Any boredom I have in an airplane is usually a sign that something unexpected is due—either a laugh or a thrill.

"One thrill I had was caused by my own shadow. I was flying among a group of cumulus clouds 3,000 feet above Pope Field, North Carolina. There was another plane in the air, but I had lost track of it. I approached a large white cloud with the sun over my left shoulder, and just as I was about to enter the cloud, the black shadow of a plane shot down toward me from the right.

"It was too late to do anything to avoid a collision. I hunched forward and waited for the crash. The next few seconds were the last word in mental agony. I did not have a parachute, so there seemed no hope, even if I were not killed instantly. I had given myself up as gone when I found myself flying safely through the cloud, and the other plane was nowhere in sight. It was the shadow of my own plane, that I had mistaken for another plane."

Planes Aid Coast Guard

THROUGH an invention perfected by Lieut.-Comdr. Carl C. Von Paulsen of the United States Coast Guard Service, amphibian airplanes can now be employed successfully in rescuing people from vessels that are wrecked on coast reefs or rocks.

Three of these rescue planes are kept at the coastguard station at Gloucester, Mass., and can be called into service quickly from a point many miles away.

The rescue device consists of a lifeline uncoiled and dropped as the plane leaves the shore and flies out over the wreck. This takes the place of the life-gun, which so often misses its mark when the projectile carrying the lifeline is shot out to the wreck.

As the plane, acting itself as the carrying projectile, rises from the beach a sash weight drops from a cylinder strapped to the bottom of the fuselage. To this is attached a light line which is paid out from the cylinder as the plane flies out over the wreck and back to land on the beach.

While the plane flies over the water, a large metal ring is released and slides down over the line, taking the line with it into the water. This prevents the wind from carrying the line away from the wreck as the flight continues. There are three of these heavy rings, which are released at intervals.

As in the case of the life-gun, when its projectile lands on or across the wreck, the light lifeline in hauled in and a heavier line attached to it. Then the breeches buoy is set up and crew and passengers can be transferred to shore in the usual approved coastguard manner.

The coastguard detachment at the government plane station at Gloucester is so skilled in handling the little plane and the new life-line that the ends can be laid at any exact spot desired.

Eagle Causes Fatal Crash

ANOTHER incident in which birds have brought trouble to airplanes invading their realm is reported from Lahore, India, where an eight-foot eagle collided with a plane at an altitude of 800 feet. The plane lost a wing and crashed, killing the pilot.

Ruth Nichols Sets New Women's Altitude Record

"MY TONGUE became cold. That was the only discomfort suffered by Ruth Nichols, society girl of Rye, N. Y., who set a new women's altitude record of 28,743 feet over New York City on March 6th.

"Shut in the cabin and warm in my reindeer skin flying suit, I was snug enough," she said after she had landed. "But when I reached 20,000 feet and had to begin breathing from my oxygen supply in the rarified air, my tongue became cold because the steel flask from which the oxygen flowed was strapped in the chill wing.

"Once I thought the oxygen, flowing under pressure against my tongue, would freeze it, but by removing the tube from my mouth from time to time I got some relief."

Speaking of oxygen, Miss Nichols owes much to that life-giving element for her record. A tank of it connected with the carburetor was turned on at 27,000 feet, permitting the motor to pull her higher.

Her machine was a Lockheed-Vega monoplane with a 600-horsepower super-charged Wasp motor. The propeller was built especially for the record attempt, and was 10 feet, 6 inches in diameter.

The former record for women was held by Elinor Smith, set nearly two years ago. She reached a height of 27,418 feet. The men's altitude record of 43,166 feet is held by Lieut. Apollo Soucek of the United States Navy.

Believe it or not—this is Ruth Nichols equipped for the record-breaking flight.

At Last!—I Solo

"The motor roared mightily. How good it sounded! I could hardly believe that I was up here *alone* — but it was true."

by ANN BOHRER

IT WAS early in the morning. Only two or three pilots and mechanics had so far put in an appearance at the Portland Airport. Clouds still hid the sun, casting a gloomy shadow over the earth and making the air chilly.

I had forgotten my gloves at home and wore but a light sweater over my coveralls. I was sure I would be too cold to fly this morning, besides I did not feel much like flying.

Sitting in the field office, I gazed out of the window and watched the first student, Freeman Clapp, "shoot" landings. I was the next student scheduled to take instruction but I definitely decided I would not fly this morning. It would be too cold and besides I was rather hungry. I had overslept and had not had time to eat. No, I would not fly.

I noted my fellow student was doing extremely well. After landing the fourth time, the instructor, Fred Schreiner, climbed out of the ship.

Oh, that meant that Freeman was going to solo! I had never seen a student make his first solo flight. I am certain I was almost as thrilled at the prospect of that first flight alone as this young student pilot surely must be.

Intently I watched Freeman as he opened the throttle and the plane began to move. Soon it was in the air. If I could only do that! We would have to pin the wings on him when he returned.

Following an old army custom, every time a student soloed, he was given large aluminum wings which he must wear across his chest or back until the next student soloed at which time the wings would be transferred to the new fledgeling. Under no conditions must the solo student arrive at the airport without his wings.

Freeman was now coming in for a perfect three-point landing. Fred was congratulating him and the wings were pinned on.

The mechanic was now getting the ship ready for me. An extra cushion was placed in the pilot's cockpit which would enable me to sit higher, and four-inch rudder extensions were attached to the rudder bar as I was too short to apply "full" rudder without them.

FRED motioned me to get in the ship. I shook my head in refusal. I saw the scowl I expected pass over his face. I turned into the office and warmed my hands by the electric heater. Through the window I saw Fred determinedly make his way to the office.

"Come on now — get into your things," he thundered as he entered.

I was sure I would freeze, I explained, and would not be able to fly well. Couldn't I go later when the sun was up?

"No, you're going *now!*" was the emphatic reply. "Here are my gloves and here is Hans' leather coat. You can't get cold. Come on now—get in that ship!"

Seeing I was making no effort to comply, he proceeded to force me into the coat and gingerly pushed me out the door.

"Just keep me up fifteen minutes," I pleaded. "That will be enough for this morning."

Strapping my safety belt securely around me, I almost wished my lesson was over instead of just beginning. If I could just solo this morning like Freeman had, but I felt certain I wouldn't even make a nice take-off, let alone a smooth landing.

Taxying onto the runway, I heard Fred's voice through the earphones.

"All right," he said, and I gave her the gun.

I found I was not as cold as I expected to be. The air was smooth and although the wind was at the moment straight down the runway, the wind sock on one of the hangars would now and then indicate the advent of a cross wind.

I knew that I would have to hold a little more rudder on the windward side in case there was a cross wind to offset the tendency of the plane drifting off the runway on the take-off or when coming in to land.

I managed a rather decent take-off and presently was coming in for my first landing, which was better than I thought it would be. Not so bad for the mood I was in. Now I took off again, made my turn and started the long flight to the other end of the field and cut my gun for the second landing.

I remembered what Fred had told me recently, that if a student succeeded in making three nice landings and take-offs in succession, he would solo. If this landing was good and my next one also, it would mean a lone flight for me.

Down I came to a nice landing. The ship rolled to a stop and I was on the verge of opening the throttle for the third time when I noticed Fred turn around in the front cockpit.

His face was very sober, his look inscrutable. I wondered what he was going to say. Probably my flying was bad and he had to assist me on my landings and now he was going to lecture me. His mouth was set in a firm line, his eyes penetrating. I could only sit and stare back.

Finally, in a matter of fact voice, "Do you think you can make it alone?" he asked.

It never dawned on me why he had put the question. I had not made the three necessary nice landings. This was only my second.

Very calmly I returned with "Why, yes, I think so."

I wasn't going to get a lecture after all and thinking this was all he wished to say to me, I prepared to take off.

What on earth was he doing? He was rising in his seat and throwing the front seat cushion over the side to the lawn alongside the gravel runway. One leg swung over the side. He was getting out! Even now my brain refused to grasp the situation.

He stood beside me and very seriously told me I had been doing nicely and knew that I could do it again if I would. He was going to let me solo! Why! I had just made two landings! I could hardly believe it.

"There is a slight cross wind now so hold a little left rudder," he admonished, "and when coming in to land, if you see that you can't make it the first time, open her up and go around again."

It was not like Fred to be so serious. I wondered if he was worried and nerv-

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ous. I must make him smile. It might relieve the tension.

"All right, I will and don't you worry or become nervous as I'm not afraid. I am not afraid at all," I smilingly told him. That longed-for, familiar smile lit his face again.

"Good luck," he said as he patted me on the shoulder and then walked over to the lawn.

OH, IF I could only make a nice take-off! It was certainly all up to me now. I had no one to rely on if something went wrong. Holding the stick way back, I opened the throttle wide. The motor coughed and finally answered in a roar.

The plane began moving ever so slightly at first, a little faster now. The motor had gained its maximum R.P.M.'s. I pushed the stick well forward, up came the tail. The plane was gathering speed and I brought the stick back to neutral.

How queer the front cockpit seemed without the broad shoulders and helmeted head of my instructor! However, I found I could see much better and it was less difficult to keep the plane on a straight path.

It was the straightest take-off I believe I had ever made. I pulled the stick back slightly as I felt the wheels of my ship leave the ground. Swift and straight as an arrow she took to the air. She was all mine! She would do anything I wanted her to.

We were now over the wide expanse of the Willamette River. The sun was making a brave effort to break through the clouds. Now and then a sunbeam would play on a wing, disappear, only to reappear across the fuselage of the ship.

The motor roared mightily. How good it sounded! It seemed impossible that I was up here alone but the front cockpit was still empty. It couldn't be a dream. It was true! How long I had waited for this moment! I was unspeakably thrilled. I felt perfectly at home in the ship, more so than ever before.

I was nearing a water tank and decided to make my turn before coming abreast it. The plane was brought around into a proper turn. This ship seemed almost human! I was laughing now and began humming a song. After straightening the ship out, I throttled back a little for the straight flight back to the other end of the field. I glanced about at the sky where the sun was playing hide and seek with the clouds. We seemed to be alone in this vast expanse of sky. Far down below the houses seemed like doll houses, the few pilots and mechanics who had already arrived at the airport were knotted together. I smiled. Evidently they were watching my every move and hoping and praying I would bring the ship down safely.

I discovered that without the added weight of my instructor, the plane had a tendency toward gaining more altitude. I nosed her down a bit and throttled back to approximately 1350 R.P.M.'s.

The motor continued to purr out in front and I sat back perfectly relaxed and enjoyed the beauty of the sky, the green hills to my left and the winding river below. Oh, this was marvelous fun flying alone! I was so happy! I had almost given up hopes of ever learning to fly, but here I was alone with a plane.

It was almost time to turn now. That small group below were probably experiencing some tense moments. More than likely they were more anxious than I, for I was thoroughly enjoying my first lone flight. I felt no anxiety whatever and remained relaxed.

I was now about a thousand feet back from the airport, which is the distance required by the Department of Commerce before turning in to land. Slowly I nosed the ship down and as slowly closed the throttle.

I remembered Fred had told me it was better to have too much speed than not enough. It would be terrible to stall her and fall off into a spin. I felt I had sufficient speed and the upturned faces of three men at the extreme north end of the airport told me they were stopping their activities long enough to watch me land.

It seemed as though I would undershoot. Better "gun" her a bit. When I was about thirty feet from the ground I began to stretch out my glide. My motor began to cough and spit. This cold air didn't seem to agree with it, so I "blipped" her.

The ground seemed to rise rather fast and it seemed as though I would still under-shoot. Again I "blipped" her, as I did not wish to land in the lawn. Now I began to level off, holding her there. I had plenty of speed, too much it now seemed to me. The lessened weight in the ship made quite a difference, I discovered.

I felt her slowly lose speed and I gently, ever so gently, held the stick back a little more. If I could just make a nice three-point landing! I wanted Fred to be proud of me. It was entirely up to me to get that tail down simultaneously with the wheels and not bounce after the ship hit the ground. The ground rose to meet me. Oh, this was going to be a bouncy landing! If I could just get that tail down in time now. I pulled the stick way back, as I felt the ship settle all the way to the ground in a three-point landing. She didn't bounce, either.

I did make it after all, but it wasn't all over yet. I had come in much too "hot" and my ship was taxiing down the runway plenty miles per hour. Now to prove I knew how to use that rudder. Anything but ground loop. I would never live that down, so I just must catch her in time if she started to swerve on me.

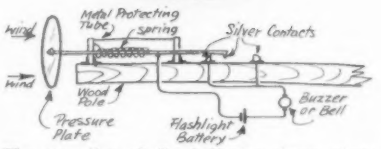
She made a mad movement to the right and as suddenly I kicked left rudder and "gunned" her. She straight-

(*Continued on page 49*)

Effective Air Speed Indicator for Gliders

Miss Johanna Busse of the Standards Gliding Club at Washington, D. C., is seated at the controls of the club's Eaglerock primary glider. Above her head is an air pressure disk, equipped with silver contacts which come together when approaching a stall.

These contacts set off the buzzer behind her back which gaves a warning



The operation of the indicator shown above is best explained by this simple diagram.

to nose the ship down before it is too late for the controls to take hold.

Running tests made on an auto on a calm day show that the warning device will go off at 22 m. p. h., and is sensitive within 1 m. p. h. As shown in the sketch of the device, a second contact also warns when too fast a dive is being made.

The Standards Gliding Club has also developed a pressure disk speed recorder similar to the stall warning device. A stylus on the end of the pressure plate traces a record of the air speed on a rotating cylindrical chart.

Thus a permanent record of each flight is available to the members of the club.

Crowded Airways Require Traffic Rules

HOW the old-timers used to laugh when the suggestion was made that the lanes of the air would be crowded with airplanes in a hundred years!

But that isn't such a funny joke now, especially since the U. S. Department of Commerce recently issued an order that flying rules on the New York-to-Washington airways would be strictly enforced.

"Because of the congestion on these airways," the order said, "it has become necessary to enforce strictly the right side flying rule. Beacon lights constitute the center line of the airway."

My Experiences in a Glider Club

I HAD joined the local Glider Club early in the spring of the year. A glider kit was purchased and we set to work to assemble our craft as soon as possible.

Our club boasted of eighteen members and more time was spent at the workshop telling funny stories and experiences than on the glider. Had our efforts in the gliding line ceased right then and there, no member could have said that he did not gain something by his experience, at least in the story-telling game.

A bit of advice may be entered here to those contemplating organizing a glider club: draw up a mutual contract that no story telling is legal during meetings. Combining the story telling craze with a set of very badly drawn-up blue prints and instructions, we finished our glider about two months later than we could have. But nevertheless it was finally completed and was not bad to look at.

A Sunday was chosen as the day upon which to try out our new craft. The day rolled around and we were all present. An aviator who was a member of our club was to try out the ship first. He did fairly well, so we all took our turns. Each member was first towed into the air by man power on his first try and by auto power on his second. It was great sport!

One poor fellow just simply couldn't get the craft off the ground. He was either afraid or just plainly attached to mother earth so firmly that he couldn't bear to leave her. Other fellows took off so quickly that they hardly had time to breath normally before they found themselves far above mother earth.

The only gliding terrain we had been able to obtain was a field of such a shape that it only allowed room for activities in one direction. Of course, the wind was from the wrong direction and after several short flights we moved to a neighboring field where more room was afforded.

The first thing to happen here was rather unexpected. We had been towing our glider with a small coupe. On the first tow at our new field the car stopped dead and refused to move. An investigation proved that some of the gears were stripped and we had to transfer our towing equipment to another car.

All the remaining flights that morning were very successful and we were about to call off the activities for the day, when the smallest member of our group decided to take another glide. We started him off behind the car on about a 200 foot cable. He seemed to be coming along very well until he reached an altitude of about 50 feet. Here he cut loose, and the wind was so strong that the ship got beyond the small chap's control and stalled. Any pilot

(*Continued on page* 57)

Waco Introduces a New Cabin Biplane

OPEN-MODEL performance in a closed ship, and monoplane visibility in a biplane design are features of the new Waco "Model C," a four-place cabin biplane. The ship marks the entry of Waco into the field of cabin airplanes.

Ease of control and ability to get in and out of small fields, its designers claim, are inherent characteristics of the new ship, which performs and handles in a manner similar to the company's open-cockpit planes.

Wide angles of vision are emphasized in the new ship. Vision is practically unobstructed in all directions—above, to the front and sides and to the rear quarters and tail.

The ship is powered with a Continental 165 horsepower motor and equipped with metal propellor, motor cowl ring, electric starter, dual controls, air-cushion wheels and brakes and tail wheel. Also included in the list price are navigation lights, a roomy luggage compartment, door lock, emergency kit, fire extinguisher, complete set of tools, tie-down ropes and motor cover.

On the instrument board are provided compass, air-speed indicator, altimeter, oil pressure and temperature gauges and gasoline gauges. The control wheel is on a jointed column, so that the ship can be piloted either from the right or left front set, and the rudder pedals are dual.

Plan to Establish New Glider Record

PREPARING to set a world distance record for glider towing flights over water, Joe Fellows, famous speedboat designer, and Richard Devine, noted glider expert, bring the two craft which will figure in the odd exploit together at Los Angeles Harbor.

Devine, piloting the glider at the end of a 500-foot towline, will attempt to reach Catalina Island, 25 miles away, from the take-off at Los Angeles Harbor.

Devine at the controls of his glider.

Here is a closeup of Devine in the cockpit of his glider at Los Angeles Harbor, where Joe Fellows' powerful motorboat, shown at the right, will attempt to pull him into the air and tow him to Catalina Island.

Movie Star Joins "Should Be Dead" Club

JOE E. BROWN, well known movie actor, is still trying to figure out just in what way he was honored when he was elected an honorary member of "They Should Be Dead" club.

Brown's latest picture, "Going Wild," is an aviation comedy in which a lot of wild stunt flying furnishes the climax. During the filming of the air sequences there were three accidents, any one of which might have ended fatally for the pilot.

Once a wheel fell off the plane while in midair and the pilot had to land the ship on one wheel, a la Lindbergh. He nosed over, tearing off one of the wings, but neither he nor the plane was otherwise injured.

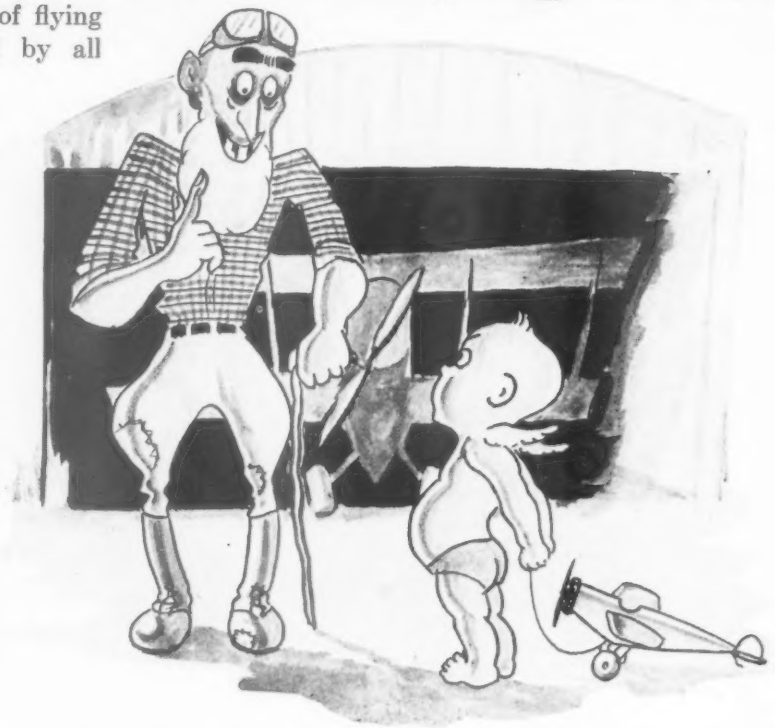
In another case a plane making a trick landing while going close to 90 miles an hour did a ground loop, shaking up the pilot and spilling a large quantity of gasoline when the feed line broke.

And in the third case, a plane overshot the small landing field and piled into a ditch, damaging the landing gear, but only slightly injuring the flyer.

The three pilots who were involved in these accidents formed the "Should Be Dead" club, and as a compliment to Brown, who had never been in a plane before making this picture, they named him as Honorary President.

Ye Book of Rules for Flying Fools

A rare and priceless collection of flying regulations. To be memorized by all diligent dodos.



1. As the telephone operator who giveth the wrong numbers, so is he who extolleth his exploits in the air.

2. For I have watched him do his stuff on the ground; Lo, for an hour have I heard him talk of himself, till he thinketh he is the best pilot ever.

3. He is like unto a woman who knoweth not how to say good-bye on the telephone; and the truth is not in him.

4. Though he be as honest as a child in all else, yet will he lie about his aerial adventures. His chest protrudeth and he maketh other men to be weary.

5. He shall enlarge upon the dangers of his adventures, but in my sleeve shall be heard the tinkling of silvery laughter.

6. Verily, men do foolish things thoughtlessly, knowing not why, but an aeroplane doeth naught without a reason.

7. Let not thy familiarity with aeroplanes breed contempt, lest thou become exceeding careless at a time when great care is necessary to thy well-being.

8. A wise pilot scenteth trouble afar and avoideth a forced landing in the waste spaces.

9. My son, obey the law and observe prudence. Spin thou not lower than 1,500 cubits nor stunt above thine own domicile. For the hand of the law is heavy and reacheth far and wide throughout the land.

10. Incur not the wrath of those in authority by breaking their rules; for he who maketh right-hand circuits shall be cast out into outer darkness and whoso flyeth low over football games shall be forever damned.

11. Let not thy prowess in the air persuade thee that others cannot do even as thou doest; for he that showeth off in public places is an abomination unto his fellow pilots.

12. More praiseworthy is he who can touch tail-skid and wheels to earth at one time, than he who loopeth and rolleth till some damsel stand in amaze at his daring.

13. He who breaketh an undercarriage in a forced landing may in time be forgiven, but he who taxieth into another 'plane shall be despised forever.

14. Beware the man who taketh off without looking behind him, for there is no health in him; verily, I say unto you, his days are numbered.

15. My son, another student pilot shall come unto thee saying, Hearken not unto the words of thy great grandfather, for he doteth; list to me while I tell thee how thou shouldst do so-and-so.

16. But a little knowledge is oft-times of great danger, and thou knowest full well that my teachings are founded on much experience.

17. Clever men taketh the reproofs of their instructor in the same wise, one like unto another; with witty jest, confessing their dumbness and regarding themselves with humour. Yet they try again, profiting by his wise counsel and taking not offense at naught that is said.

18. For who so harkeneth to his precepts shall fly in safety, and shall be quiet from fear of trouble.

19. A reproof entereth more into a pilot of sense than an hundred compliments into a fool.

20. Mark the lady pilot, how she acquireth a fondness for pants; yea, though she be otherwise modest, yet doth she dress herself in ungodly raiment, displaying her limbs. Though she clotheth herself in breeches, yet doth she wear high-heeled shoes always. Her mirror must know her naught, else would she refrain from masculine attire.

21. Though she fly alone at great heights, yet is her powder puff close to her hand; her appearance causeth her more concern than the running of her engine.

22. Knowest thou a pilot who criticiseth not another pilot's flying? I say unto you, there is not one who cannot point out another's faults and advise him, what he should do.

23. Better is a dancing partner with two left feet than he who laggeth behind in a formation and keepeth not his appointed place; for the leader breedeth wild thoughts.

24. As a wet dog who shaketh himself beside thee, so also is a pilot who usurpeth thy rightful place when landing from a formation. Woe be unto him who landeth before the leader.

25. Though the leader taketh thee over the city at low altitudes, having no regard for thy personal safety, yet wilt thou follow him closely; but on the ground wilt thou revile him after.

26. As a plate of cold soup, yea, even as a kiss from one's sister, so also is a flight without a purpose or objective; it lacketh a kick.

27. As a postage stamp which lacketh its glue, so are words of caution to a fool; they stick not, going in one ear and out the other, for there is nothing between to stop them.

28. If thine instructor shouldst say unto thee: Take thou this 'plane, for it is as good as the one of thy choice; then shalt thou listen politely but ignore his counsel.

29. For if thou wouldst do well in competitions, see that thou hast the 'plane which thou thinkest thou can fly with greatest ease.

30. My son, hearken unto my teachings and forsake not the laws of prudence, for the reckless shall not inhabit the earth for long.

31. Hear instruction, and be wise, and refuse it not; thus wilt thou fly safely; length of days, and long life, and peace shall be added to thee.

Published by courtesy of the Montreal Light Aeroplane Club.

Aviation Training for the Blind

A FLYING club for the blind has been started at the Perkins Institution for the Blind at Watertown, Mass. The boys at this institution have become very much interested in the subject of aviation, and have had one or two experts out to the school giving them interesting talks.

One of the boys has built a model plane and it is now one of the prized exhibits at the school. This youngster did his own thinking, never having seen or been able to see a plane. He built and rigged it like one of the early monoplanes, from descriptions read to him by someone who could see.

The new flying club, one member of which has already made a flight with Bon Bon de Arce, the noted ace, is composed of older boys at the school, aged from fourteen to twenty.

An effort will be made by interested parties with influence to obtain for the club some of the discarded flying equipment from the army and navy departments which will be sent to the school and used for the lads to feel over with their fingers and get mental pictures of airplanes of the De Haviland type.

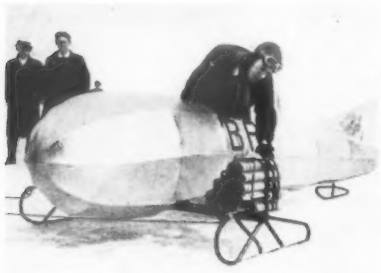
Novel Rocket Powered Sled

HARRY W. BULL, Syracuse, N. Y., University student, is here shown in his rocket propelled ice boat which he plans to test soon.

The youthful inventor designed and built the craft with the help of his sister in his spare time from classes at Syracuse University. He expects the craft to accelerate at the rate of 20 feet a second.

Eighteen rockets are used to get the craft under way. As it reaches maximum speed ten more rockets are discharged, and a few moments later eight more rockets will let go to carry the ship to the end of its run.

Unlike the German rocket boats, the ship is pulled instead of pushed by the

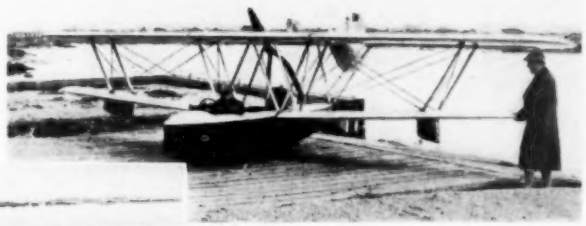


exploding rockets. Bull is shown inspecting the packet of rockets carried on both sides of the airplane-like fuselage.

[*Since the above was written, we see from newspaper reports that the boat was successfully tested on March 9th. It is said to have attained a speed of 75 m.p.h.—Ed.*]

Tiny Flying Boat Has Speed of 75 M.P.H.

An idea of the small size of this craft may be obtained from the picture on the right. Below is shown the installation of the outboard marine motor and the unique power drive.



HENRY BOOTH, of Freeport, Long Island, has designed and built a two-seater "baby flying boat," powered with a 32-horsepower outboard motor, that has an 8,000-foot ceiling and a top speed of 75 miles an hour.

The craft has a landing speed of 36 miles an hour and consumes only three gallons of gasoline an hour. It has a wing spread of 28 feet and, fully loaded, weighs 700 pounds.

This plane is the first two-seater craft to be so powered, although some months ago a midget outboard-powered airplane, weighing only 300 pounds, designed by George Heinemann of Bellingham, Washington, made a successful flight.

The combination boat and airplane designed by the Robertson brothers of Alameda, California, a year or so ago was one of the first in which an outboard motor was used to power a heavier-than-air craft.

Empire State Building Mast Believed Impractical

ALTHOUGH the builders of the world's tallest skyscraper, the Empire State Building in New York City, are rushing to completion a mooring mast for dirigibles on the lofty tower, there is doubt in the minds of many aeronauts as to whether or not such "landings" are possible.

The diversity of wind currents among the tall buildings on Manhattan and the difficulty of guiding a dirigible safely through those towers without puncturing the gas bag on flag poles, radio antennae and other pointed projections make the undertaking hazardous.

The visit to New York City last December of the semi-rigid dirigible J-4, auxiliary of the Los Angeles, which approached the Empire State Building's mooring mast, and after a half-hour's futile maneuvering went back to Lakehurst, illustrated the difficulty of a landing.

A strong west wind was blowing when the ship approached the mooring mast, but a handkerchief held in the breeze was blown straight up by a vertical current rushing up the perpendicular sides of the building.

Lieutenant S. M. Bailey, commander of the J-4, said he was kept so busy at the controls on account of the gusts and eddies that he was unable to notice the details of the mooring mast; and that the oscillating currents threatened to warp the ship about and send it into one of the neighboring buildings in the congested area around the Empire State Building.

Sheep Transported by Air

AT Wau, New Guinea, airplanes were used a short while ago to carry a flock of sheep to grazing paddocks hacked out of the jungle and planted with sweet grasses from Australia.

Transporting the sheep by air saved time and eliminated danger of the sheep being attacked by wild animals or dying from disease that might have been contracted had the effort been made to move the sheep over rough, unbroken, disease-infected country by any other means.

French Airline Introduces Aerial Taxis

A FRENCH airline has recently introduced small taxi planes that actually carry taximeters. They are beautiful, trim-looking little planes carrying four passengers and may be engaged by the hour or kilometer (six-tenths of a mile) for private trips in almost the same manner as a taxicab.

The large amount of special and private flying trips this particular company has had the past two years is said to have made the need for this service imperative, and, according to reports, the kilometer or hour rates for these planes are surprisingly low. The company keeps the planes ready for service at any time of the day or night.

Two Entries in
The RACE to BECOME the

The Arrowhead Safety Plane
Pusher Type—Biplane —Tailless

by E. W. SUDLOW

THE November issue of POPULAR AVIATION contained a brief announcement of a radical craft—the Arrowhead Safety plane. To say the least it is an unusual craft—a tailless, pusher type—and far different from the appearance of the conventional plane. The late Glenn Curtiss was exceedingly interested in and devoted considerable time during the latter days of his life to this design. He called it the future "Air Flivver."

The plane is a biplane, with a three-wheel landing gear. The wings are mounted with a sweepback of approximately 30 degrees. The ship derives its name of "Arrowhead" from the lack of fuselage. A short cockpit and engine nacelle is designed to carry any engine of from 25 to 50 h. p.

The principles governing the practical application of inherent stability in tailless airplanes were first discovered by Lieutenant Dunne, of the British Army. Under his direction a series of experiments to determine the value of the idea were carried out in England. At Marblehead, Mass., a number of tailless airplanes embodying the Dunne ideas were constructed by the Burgess Airplane Co. in 1913-15.

These planes were put through severe tests and conclusively demonstrated that inherent stability and simplicity in flying technique were to be had in this type. Though crude as to constructional detail, and inefficient from an aerodynamical standpoint, these early planes had inherent stability and ease of flying characteristics which marked them as a thing apart from the other planes of the day.

The advent of the World War put a stop to the experimental development work on this highly interesting and unique type of aircraft. Recently, however, interest in the tailless plane has been rearoused, and today extensive experiments are under way in both England and Germany.

The first plane of this type to be built in the United States since the World War was flown at the All-American Air Races at Miami, in January, 1931. Considerable attention was attracted to the unique plane and its performance.

Commercial production of the Arrowhead tailless plane has been undertaken and the program announced by the company calls for immediate construction of three or four experimental ships.

All of these designs are concentrated around the one basic type—the tailless airplane. Radical improvements in the system of controls, the landing gear, passenger comfort and safety, and economy of upkeep and operation are embodied in the construction.

Several of the specific improvements which have been incorporated into this group of tailless planes are these:

First and most important are the aerodynamical characteristics which are inherently a part of the tailless plane. Absolutely dependable inherent stability in any weather, freedom from any tendency to stall or nose dive, the impossibility of going into a tail spin, and the general incapability of getting into any dangerous maneuver requiring the skill and judgment of an expert pilot to recover from.

To some extent these features were to be found in the first group of Dunne machines built many years ago. In the present design these typically safe features are amplified and improved upon, and at the same time a marked improvement in flying efficiency is obtained by the use of the latter types of aerofoil sections.

The Arrowhead was designed by James W. Davis, former engineer with the Burgess Airplane Co., where the first tailless planes were built.

The only serious objection which was ever brought up in connection with the tailless Dunne planes has been entirely overcome by radical changes and improvements in the ailerons and their controlling mechanism.

These improvements involve the use of split ailerons, so hooked up to the control levers that the normal pitching and banking and steering maneuvers can be accomplished, either singly or in combination, by the sole manipulation of the ailerons themselves.

Another point in favor of the tailless plane is the reduced time necessary to learn to operate it. On account of the instinctive ease in the method of handling the controls, coupled with its incapability of assuming dangerous attitudes while in flight, the amount of time required for flying instruction is cut to one-half or to one-quarter of that necessary in other types of planes.

The Arrowhead Safety plane is an unbelievably simple machine to fly, and one that very nearly approaches the fool-proof plane. It is less intricate in construction, and many parts are eliminated entirely, at a proportionately lowered cost of production.

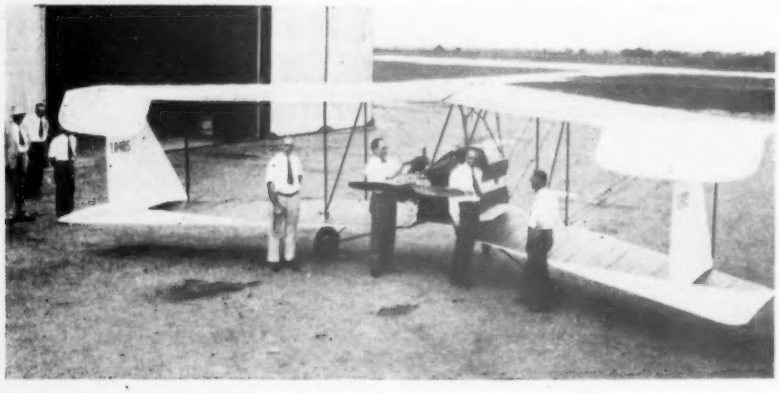
The landing gear is of a very simple type, utilizing Goodyear air wheels.

The pusher location of the motors provides a vastly safer installation in case of fire than the conventional tractor offers. Of special interest in connection with the employment of pusher propellers is the exceptional degree of visibility obtained.

The pilot and passengers have an unobstructed view forward, to the sides and to the rear. There is nothing what-

(*Continued on page* 57)

The outstanding characteristics of this unusual design are clearly shown in this view. The individually operated ailerons are largely responsible for the plane's success.



FUTURE "AIR FLIVVER"

The Doodlebug was designed by James S. McDonnell, Jr., shown here (at the right) with David Ingalls, Assistant Secretary of the Navy for Aeronautics.

The "Doodlebug" Tractor Type—Monoplane —With Tail

by DICK HAM

Scientific entomology deserves a slight apology;
An inventor really shouldn't give his fancy so much rein,
But there is no insect creature possessing every feature
That the "Doodlebug" embodies in a flivver monoplane.

J. S. McDONNELL Jr., designer of the odd little airplane that bears his name but is nationally famous as the "Doodlebug," grinned broadly when asked how in the world he happened to select so quaint a nickname for it.

"Well, I had to name it *something* in a hurry before entering the National Ar Races here last August. When you look at most airplanes you think of birds, but there's something about mine —the way it hops off and the way it lands—that suggests an insect." The inventor chuckled.

"Besides, I'd built a flivver plane, you know, and flivvers are supposed to be a sort of insect pest.

"Words like cricket and grasshopper seemed too tame and common. I wanted one with a kick to it and a little humor too, if possible. So I called my ship the Doodlebug because it acts like a doodlebug would if there were such a creature."

That was my introduction to Jim McDonnell.

For the past two years he has devoted practically all his time and financial resources to the Doodlebug, yet with the bug an accomplished fact, he treats the whole story as one of amusing adventure.

But he is in an earnest mood when you get him started on his basic idea —the world's need for a small, cheap, foolproof plane like the Doodlebug, a flivver of the air.

"I've just come back from Washington," he announced, quietly, "where I sold the Doodlebug to the National Advisory Committee for Aeronautics."

"Does that mean you have disposed of your commercial interest in the plane, Mr. McDonnell?"

"Oh, no, not at all, I merely sold the plane itself because the national committee wanted to test it for strains and stresses and for the most minute details in measurements.

"The government has recently completed the biggest wind tunnel in the world at Langley Field, Virginia, and I have been assured that my plane will be one of the first tested in it. Incidentally this tunnel cost $900,000 and measures 60 x 30 for subjecting full-scale models to winds of 100 miles an hour from every conceivable angle."

A small model of the Doodlebug stands on a blue-print littered draughting board in McDonnell's Chicago office. Pictures on the walls show the Doodlebug in flight and in various ground positions. The designer used these exhibits frequently to clarify his verbal description of the tiny monoplane.

The Doodlebug has an over-all length of 21 feet 4 inches and a wing span of 35 feet with a chord of 38 inches. The landing gear has the unusually wide tread of 12 feet 4 inches. Empty it weighs 1250 pounds and the gross weight with pilot and passenger, baggage and full tanks is 1800 pounds.

It is a low-wing, semi-cantilever monoplane equipped with a 110 h.p. Warner Scarab motor. It develops a high speed of 101 miles per hour with standard equipment and has a low speed of less than 35 miles per hour.

So much for what the Doodlebug *is*. What it *has done* is best told in McDonnell's own words as he relates his experiences of the past two years.

"In 1930 I did what I think no other pilot ever has done to test my monoplane as no other airplane has been tested. For twelve months I never travelled in a railroad train, using the air for every possible purpose.

"In that time I flew the Doodlebug 26,000 miles in all parts of the continent—over the Rockies, up to Toronto, Canada, east to Atlantic City, N. J., and south to Miami, Fla. I participated in the National Air Races in Chicago last August, in the National Air Tour in September that carried us 6,000 miles and in the All-American air races at Miami, Fla., this January.

"It was my purpose to test the Doodlebug under every flying condition and I encountered some unusual adventures. One of the most trying experiences was bringing the Doodlebug down for a forced landing at night and in a dense fog.

"Then there was a forty mile flight I made to Pinehurst, N. C., from a little town to the south. The clouds were hanging so low that the 'ceiling' was actually on the treetops. This flight illustrates the safety feature of such a low speed plane.

"I had no way on earth to tell where I was going, so I came down almost on the ground, close enough to see and follow a railroad track that led me to Pinehurst. I was really flying lower than some of the trees that formed sinister black banks on either side of the tracks all the way. You couldn't do a thing like that with an ordinary airplane.

"But this takes us back to a proper starting point, early in 1928, when I

(*Continued on page* 54)

Unfortunately this flight view of the Doodlebug does not show the use of the wing flaps which are responsible for the almost unbelievable performance of the plane.

1931 Inland Super Sport Has Trim Appearance

This model holds the American speed and altitude records for planes of its class.

THE Inland Aviation Company has gone into production on the new "Super Sport," a two-place, side-by-side seat monoplane.

This model is similar in design to the company's original production, the Inland Sport, but has been generally improved in appearance, equipment, performance and flight characteristics.

One of the noticeably convenient features of the "Super-Sport" is the unusually large baggage compartment located immediately behind the cockpit.

The bucket type seats are equipped with comfortable Kapak cushions for use when parachutes are not worn. The instrument board of the "Super-Sport" which holds the American Speed and Altitude Records for planes of its class, carries bank and turn indicator, rate of climb indicator, and time of flight clock in addition to the usual instruments. The price of the "Super-Sport" is $4,850.

Powered with a 110 h.p. Warner Scarab, this model carries an A. T. C. No. 315. Its performance follows:—

Span	30′-0″
Length	19′-0″
Weight Empty	916 lbs.
Useful Load	574 lbs.
Fuel Capacity	31 gallons
Top Speed	132 m.p.h.
Cruising Speed	100 m.p.h.
Landing Speed	45 m.p.h.
Climb	1650 ft./min.
Ceiling	19,650′
Radius	500 miles

Pursuit Plane Carries Six Guns

A REMARKABLE new single-seater fighting plane has recently completed secret tests by the British Air Force.

This English machine, the first of its kind in the world, is equipped with six machine guns instead of the two guns normally fitted to similar one-man planes.

Two guns are placed in grooves at the sides of the fuselage, arranged with synchronizing gear to fire through the propeller. Four other guns are mounted in the wings, the barrels projecting a few inches from the leading edge of the upper and lower wings.

At the will of the pilot these six guns may be fired simultaneously, throwing out a continuous "cone of fire." The guns are sighted to converge on a target some hundreds of yards away.

Though it is not quite so speedy as Britain's fastest single-seaters the new "multi-gun" fighter, despite its heavy load of guns and ammunition, has a top speed of 194 m.p.h. and a ceiling of 26,100 ft.

It is driven by a supercharged radial 480 h.p. Bristol "Jupiter" air-cooled motor equipped with a Townend ring for streamlining the engine.

The plane is a product of the Gloster Aircraft Co. and will probably be seen for the first time in public at the next annual R. A. F. Display, due to be held at the Hendon Aerodrome in June.

Flight Conditions in Australia

ONE of our Australian readers, P. B. Burden of North Adelaide, So. Australia, sent us the following news items which show the progress that aviation is making in that country.

During recent floods in Queensland, Australia, when all modes of road transport failed, many out-back stations (ranches) received the whole of their Xmas mail and supplies by airplane.

The goods were attached to parachutes and planes circled low over the marooned sections to accurate shots.

* * *

A real use has been found for the light plane by an Australian station owner who regularly inspects his outlying stock and windmills in a fraction of the time it took formerly by car. When it is remembered that some of the northern Australian cattle stations would cover some of the smaller American states the enormous saving of time and money is readily appreciated.

* * *

Weather conditions have to be pretty bad to stop airway operations, but when this does occur the inconvenience is often very great. To take one recent instance: when heavy rains prevented a West Australian Airways mail plane from reaching its objective the mails were transported over the intervening 20 miles by pack horse; the journey over the rugged country road took 14 hours.

1931 Air Tour to Visit Mexico

THE tentative route for the National Air Tour of 1931 for the Edsel B. Ford Trophy comprises a 6,425-mile swing through the South and Southwest and a circle tour of Mexico. The most important stop in Mexico will be in Mexico City, the capital. Twenty-one days will be required for the flight.

According to the tentative plan, the tour will enter Mexico at Brownsville, Texas. The air caravan would then stop at Tampico, the oil center; Mexico City, Leon, Agua Caliente, Zacatecas and Torreon, re-entering the United States at Eagle Pass, New Mexico.

The Sad Fate of a Fog-Bound Flyer

ON HIS way back from Langley Field, Va., the fog rolled in on Lieut. Lindsay Bawsell, Mitchell Field pilot. He had the choice of landing in the water or a two by four field directly beneath him. He chose the field, made a perfect landing and sat down to wait for the fog to lift.

While waiting for the weather to clear up and come to his rescue, he decided to inspect his newly acquired airdrome. Imagine his embarrassment when he found it to be but half as large as it should be were he to make an endeavor to get out of it.

The last reports stated that Lieut. Bawsell was still sitting in a little truck garden outside of Keyport, New Jersey, waiting patiently for the emergency truck from Mitchell Field to arrive, take his ship apart and give him a ride back home.

Students Use Plane in School Work

THESE students of the Zoology class of the University of Miami get a ducking when they take their lessons.

Diving helmets, air compressors and a giant 22-passenger Pan American flying boat of the "Commodore" class are all a part of their equipment on special

under-water studies in search of rare marine fauna.

Here they are on the deck of the flying boat having their "ups and downs" getting sea fans, coral shells and other species of fauna for a class report.

The Triplane Will Return

A review of the proven merits of the triplane and a prediction that despite the present fashion for monoplanes, the 3-wing design will gain increasing favor.

by

J. B. ROBERTS

WAR, that great proving ground for all types of aircraft, left us with three successful and developed airplane wing arrangements, notably the monoplane, the biplane and the triplane, all of which saw active and effective service during the hostilities.

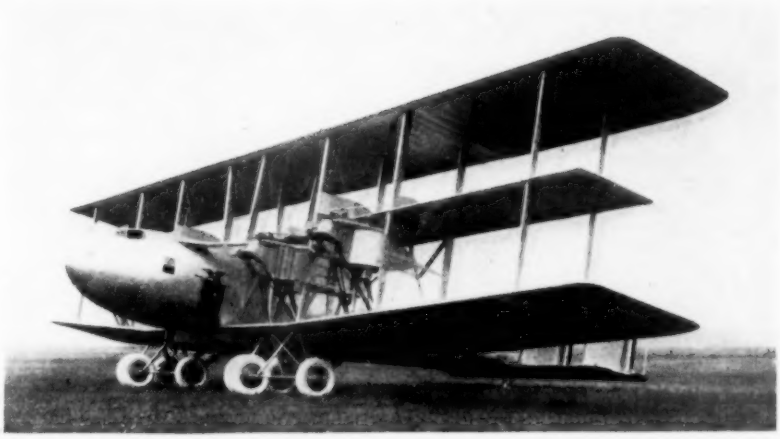
However, the present popularity of the monoplane has so obscured the other two types in the public mind that the many inherent advantages of the biplane and triplane have largely been forgotten or ignored in most civilian constructions.

It is interesting and instructive to note in this regard, that while the civilian tendency is directed almost exclusively toward the monoplane, yet the biplane still remains the standard ship in our army and navy air service where performance is paramount and where cost is only a secondary factor.

It might be said without much dispute that the present popularity of the monoplane began shortly after the Lindbergh transatlantic flight and that the great majority of modern planes are offshoots from the "Spirit of St. Louis."

This exploit marked a great change in design, which from many standpoints cannot always be regarded as a great advance in aviation, and the whole performance savored of faddism, copyism or what you like.

The old true and tried biplane was rejected for the somewhat fickle and unstable monoplane in all sizes and types ranging from mosquito light planes driven by motorcycle engines to the heavy freight carrying transports. Practically the only ship not displaced by the monoplane is the two and three-seated open-cockpit trainers for students.



An experimental Barling Bomber. With a span of 120 feet and powered with 6 Liberty engines, this tremendous triplane carried 6 men and 5,000 pounds in bombs.

At the beginning of the war there were many monoplanes in active service, particularly in the French air service. The Borel-Morane monoplane was a prominent example and there were also various monoplanes behind the German lines as well.

Gradually, the biplane forged to the front and superseded the monoplane until at the end of the war practically all of the machines were of the biplane type regardless of size or condition of service.

In 1918-1919 there was intensive experimental work being carried out with triplane structures. Curtiss produced a small triplane "scout" while a small high-speed Fokker triplane was frequently seen along the German lines near the close of the war.

Therefore, after exhaustive experimentation by the military authorities, the tendency was toward biplanes and even triplanes rather than toward monoplanes, and the same trend follows today in most military services.

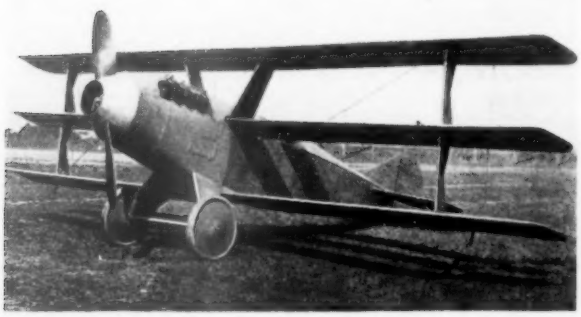
MONOPLANE wing boosters have only one song on their phonograph rendition, and that is "higher efficiency." It is assumed, but only true in part, that a monoplane wing is more efficient than an arrangement in which two or three layers of wings are superposed upon each other.

This is very true from a strictly aerodynamic standpoint for the reason that there is a most decided interference between the various surfaces of a multiplane, and a corresponding loss in the lifting capacity where two or three layers of wings are employed.

This, of course, calls for more power and more fuel, which in turn decreases the possible cruising radius of the ship.

On the other hand, and balanced against the interference loss are certain advantages such as the better aspect ratio and the lighter wings, so that the total or overall efficiency of a multiplane is not so very far from monoplane efficiency, all factors considered.

The Curtiss Triplane of 1916.



The Curtiss Kirkham Triplane.

It is very interesting to note that the wing structure of either a biplane or monoplane can be built very much lighter than the structural members of a cantilever monoplane of the self-supporting type, and therefore, this again tends to offset any losses due to the interference between surfaces.

Either the biplane or triplane cell can be converted into a very effective truss of great rigidity with light members while the cantilever monoplane construction calls for heavy costly wing girders and other constructional details.

If the monoplane wing is of the braced type, with external members exposed to the wind, then its efficiency is not markedly greater than that of any other type, and sometimes the external bracing of a monoplane may create more resistance than that of a well designed biplane or triplane.

And as to the matter of compactness, it is almost self-evident that a wing of given area will be of smaller dimensions when divided into two or three surfaces than when it is combined in the single monoplane surface, even though about 25 per cent more surface is added to the multiplane wing for compensation against interference losses.

It does not require a volume to prove that the compact triplane costs less to house and simplifies the hangar problem that exists at many airports and flying fields, and further, that this factor is of unestimable importance in the care of large transports and cabin planes.

As to the wing size, let us choose a triplane having three surfaces with a span of 20 and a chord of two feet, giving 40 square feet per plane or a total of 120 square feet for the complete triplane. The aspect ratio of span to chord is $20/2 = 10$, which is fairly high, and gives an efficient performance with most wing sections.

Now, if the same area of 120 square feet is incorporated in a monoplane wing with aspect ratio of 7.50, then the span will be 30 feet with a four-foot chord.

The monoplane has a span ten feet greater than that of the triplane, and the lower aspect ratio has much to do with the equalization of the performance.

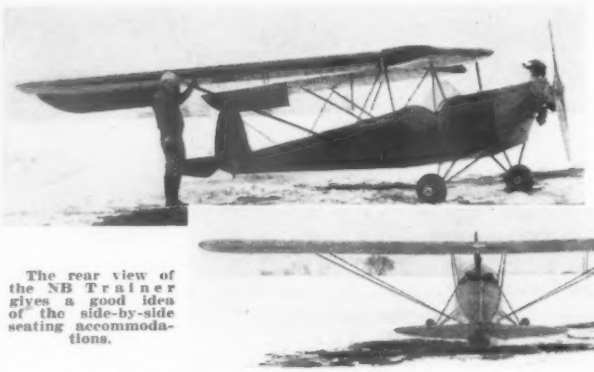
GOING back to 1918, we find a number of triplanes serving in both the Allied and German armies, the Caproni and Sopwith triplanes in the former, while the little Fokker triplane served the Germans.

The large Caproni triplanes, used as bombers, were familiar features of the landscape. With some revisions, these would serve admirably as freight and passenger carrying transports.

The fact that these triplanes were started near the end of the war, indicates that the principle had but little development, and also, that the trend was toward more lifting surfaces at

(*Continued on page* 52)

Nicholas-Beazley Brings Out Lightplane



The view to the left shows how the wings may be folded back to allow for storage in a small space.

The rear view of the NB Trainer gives a good idea of the side-by-side seating accommodations.

AFTER developing five experimental ships, three Tractors and two Pushers, equipped with several types of engines the Nicholas-Beazley Airplane Co. is entering production on the new NB Trainer.

The NB Trainer is a side by side two seater, with a 36-inch cockpit, well upholstered and equipped. It is easy to enter and leave through the door in the side, easy to fly, and maneuverable. It will not fall off from any stall position nor voluntarily spin right or left, and is directionally, longitudinally and laterally stable. It can be hangared in a space 11 x 23 feet, due to its folding wings.

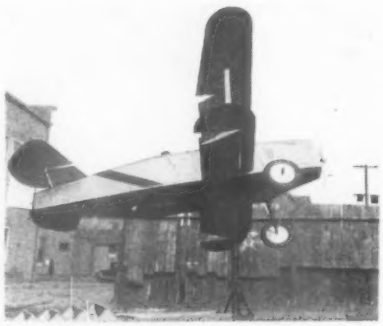
Its specifications and performance follow:

Span	37½ ft.
Length	22 ft. 2 in.
Weight, empty	550 lbs.
Useful load	410 lbs.
Gas	10 gals.
Top speed	83½ m. p. h.
Landing speed	31 m. p. h.
Climb, full load	575 ft. p. m.

The NB Trainer is powered with the Continental A-40 or Szekely SR3, 45 h. p. Model "O" engines.

Final flight tests have already been completed at the factory field and the new model will be formally introduced at the Detroit Show.

Novel Training Plane



Pivoted at the center of gravity, the trainer is free to assume any position.

THE world's safest plane, because it never goes higher than ten feet, was recently exhibited by a Cleveland firm.

The machine is designed to give students the feel of the air without possible chance of an accident. It is mounted on a ten-foot pole and is capable of all maneuvers of a real plane with the exception of looping the loop. The trainer will turn, bank, spin, nose up or down with the slightest movement of the controls.

The propeller is operated at high speed by an electric motor.

The inventors, Martin F. Rich, a former war pilot, and Morton Helper plan to put the machines at airports and amusement parks as a thriller attraction.

Eskimos Are Airplane Boosters

ESKIMOS apparently appreciate the new speeds made possible by flight, for, according to the crew of a Hudson Bay Company's trader, the Eskimos at Herschel Island think little of paying $375 for an airplane ride to Edmonton, Alberta. However, these Eskimos are by no means poor, as they are in the white-fox fur business and earn large sums yearly.

Frightened Cattle Warn Lost Pilots

CATTLE grazing along the regular routes of air lines quickly become accustomed to the roar of airplane motors, and pay very little, if any, attention to them thereafter.

But when planes have to make detours because of weather conditions, or for other reasons, their pilots know they are off their course even without the use of the earth inductor compass or radio direction finding apparatus by the action of the cattle below them; for they know that the frightened animals are unused to airplanes and that the plane is off its regular course.

This phenomenon has been commented on frequently by aviators who, when flying off their regular courses on the big transcontinental air lines have noticed these normally mild creatures tearing about the field below them like all possessed.

Jimmy Doolittle~Air Wizard

An intimate biographical sketch of one of the world's most famous flyers.

by GEORGE SMEDAL

EIGHTY thousand people were in the stands and scattered about the airport. Eighty thousand pairs of eyes were riveted at a diving, swerving, looping airplane in the sun-kissed sky.

Suddenly the plane started a dive toward the ground. Then, before the terror stricken crowd, the wings of the plane were seen to tear off. Gasps arose from thousands of throats. Every eye followed the hurtling plane.

Then another object was seen beside the wingless craft. A huge white umbrella opened and everybody knew that the pilot had saved himself by the use of his parachute. It was an unexpected thrill. Everyone breathed a sigh of relief and saluted the daring aviator.

The visitors at the national air meet at Cleveland in August of 1929 turned to other diversions. Within a few minutes they again turned their eyes to the heavens.

Immediately they realized what had happened. The pilot who had lost the wings of his airplane had another plane and had gone aloft as soon as he landed. There he was more than a mile in the air completing his routine of stunts.

Every army pilot must make a report on a standard form of any and all mishaps that occur to him or his airplane. About the middle of the week of the Cleveland air meet there came to Washington one of these reports.

Among the information that must be entered upon this form is "Description of method of leaving plane." This pilot made the following laconic notation:

"Thrown out."

This incident gives us a good insight into the character of the man who is known on the U. S. Army Air Corps rolls as Lieutenant James H. Doolittle.

JIMMIE DOOLITTLE, as he is best known, is perhaps the most popular flier in the army. Short, about five and a half feet, stockily built, his face is tanned with the winds of scores of countries. Jimmie Doolittle has had a part in more flying adventures than any other army aviator.

One would be excused for doubting the fact that this little fellow often found with his hands and face besmeared with oil and grime, is one of the country's leading aeronautical engineers as well as a most daring airplane pilot.

The University of California granted him the bachelor of science degree and after being selected by army officers for special studies at the Massachusetts Institute of Technology he won two of the highest degrees that school can confer: doctor of science and master of science.

"If anyone could be called the finest and most skillful flier in the world I would nominate Lieutenant Doolittle for that honor," declares Lieutenant Lester J. Maitland. "He flies, in my opinion, with more beauty and more finesse than any other man who sits behind the stick today. It is as if his personality exercises its influence over the plane and it becomes a live and understanding thing."

It must have been a great day for Jimmie Doolittle when he was awarded the Distinguished Flying Cross and also the Oak Leaf Cluster, the latter given for second citation. But I think those who had to do with citing Lieutenant Doolittle had a hard time figuring what particular achievements of his should be mentioned. You see he has done so much.

The war department agreed on the following:

"James H. Doolittle, first lieutenant, Air Corps, then first lieutenant, Air Service, United States Army. For extraordinary achievement while participating in an aerial flight. On September 4-5, 1922, Lieutenant Doolittle accomplished a one-stop flight from Pablo Beach, Fla., to San Diego, Calif., in 22 hours and 30 minutes elapsed time, an extraordinary achievement with the equipment available at that time. By his skill, endurance and resourcefulness he demonstrated the possibility of moving Air Corps units to any portion of the United States in less than 24 hours, thus reflecting great credit on himself and the Army of the United States."

Lieutenant Doolittle was awarded an oak-leaf cluster for the following extraordinary achievement while participating in aerial flights:

"During March, 1924, at McCook Field, Dayton, Ohio, Lieutenant Doolittle, piloting a Fokker PW-7 pursuit airplane, performed a series of acceleration tests requiring skill, initiative, endurance and courage of the highest type. In these tests a recording accelerometer was mounted in the airplane and the accelerations taken for the following maneuvers: Loops at various air speeds; single and multiple barrel rolls; power spirals; tail spins, power on and off; half loop; half roll, and Immelman turn; inverted flight; pulling out of dive at various air speeds; flying the airplane on a level course with considerable angle of bank; and flying in bumpy air.

"In these tests the airplane was put through the most extreme maneuvers possible in order that the flight loads imposed upon the wings of the airplane under extreme conditions or air combat might be ascertained. These tests were put through with that fine combination of fearlessness and skill which constitutes the essence of distinguished flying. Through them scientific data of great and permanent importance to the Air Corps were obtained."

The idea for the now famous one-stop flight germinated in Doolittle's mind while he was at Kelly Field, Texas. Up to that time his life as an army aviator had been rather routine including patrol duty on the Mexican border.

The importance of his long flight will be fully realized when it is known that he was compelled to take an old DH-4 plane and rebuild it for this flight. Among the changes was the installation

Recently voted the most capable pilot in America, Jimmy Doolittle has won his way into the hearts of the American public with his daring exploits and his thrilling exhibitions.

of extra gasoline containers in the forward cockpit.

When Lieutenant Doolittle does anything he does it thoroughly. Before making the one-stop hop he flew over the route all the way to San Diego and then back to Jacksonville. He studied his route and learned all about what to anticipate on this pioneer flight.

On the first attempt he smashed his plane because of the extraordinary darkness and the treacherous beach and ocean. He had his plane quickly repaired and was soon ready to try again. On his successful flight he ran into a terrific electrical storm near New Orleans. But perhaps the storm helped him. By the piercing gleam of the thundering lightning he could see better.

At San Antonio he came down for gasoline and in a few moments he was off again. Twenty-two and one-half hours after taking off near Jacksonville he had covered 2,300 miles and set his plane down at San Diego, the first pilot to accomplish the aerial crossing of the continent in one day.

AMONG Jimmie Doolittle's many accomplishments as an airman was the winning of the Schneider Trophy race in 1925 when he hurled his plane across the course at the then unheard-of speed of 232 miles an hour.

In 1926 Lieutenant Doolittle was in Chile as a representative of an American airplane manufacturer. It was a demonstration tour to show the qualities of an American built airplane. That was Doolittle's job, now that he was on leave from the army.

But it looked like a tough break for Jimmie and the company he represented. A few days before the demonstration before government officials and the general public the American aviator broke both legs. Imagine Jimmie Doolittle, the dare devil of the army fliers, faliing off a balcony and breaking his legs!

It turned out that the American army ace was to have competition. A German airplane manufacturer also had a plane there for demonstration and one of the greatest war aces Germany produced was to pilot it.

Jimmie got wind of this. A few minutes before the start of the demonstration an automobile whizzed up to the hangar where Jimmie's plane was housed. The craft was rolled out and two men lifted a helpless figure into the cockpit.

When he was fairly well adjusted Jimmie Doolittle took a small saw and cut away the casts about his legs. Thus he was given more freedom to operate the controls. As he hurled the casts over the side of the cockpit he started his plane roaring across the field.

Following the German plane which was already in the air Jimmie Doolittle put his plane through every maneuver the German attempted. Then he threw in a few extra ones for good measure, stunts that made the crowd gasp.

During the exchange in the air—a regular dog fight it turned out to be—Jimmie by his superior piloting forced the foreigner to take to the ground for his own comfort.

When Jimmie landed his face was pale and knotted with pain. A representative of the foreign company insisted that the American flier had endangered the life of the foreign pilot. Jimmie replied that there had always been plenty of clearance between the two planes—ten feet. The German got abusive and Jimmie told him to go and ask his own pilot.

As the worried German turned to comply with this suggestion he faced his own pilot. With outstretched hand the German congratulated Jimmie on his skillful piloting. This true sportsmanship of the German pilot touched everybody present.

Jimmie couldn't wait, however. He had a long tour of South America to make. So he hopped into his plane and flew over the Andes mountains, legs in cast and all. It really must have been odd to see a fast, sleek plane come down to a gentle landing, watch the pilot throw out a pair of crutches and hobble across the apron.

THE outside loop, the maneuver which places the pilot of the airplane outside instead of inside the loop, was originated by Lieutenant Doolittle. Not over a half a dozen aviators have been able to do this stunt—and tell about it afterwards.

"It is dangerous business," according to Lieutenant Maitland, "and requires a flier who can get every ounce of power and instantaneous response out of the plane he is using.

"Lieutenant Doolittle was first to demonstrate that the outside loop could be completed. There were many who believed that it could not be done. This flight made the aeronautical world sit up and take notice."

In 1929 Doolittle seated in a cockpit entirely enclosed, making the pilot "blind," guided his airplane into the air, flew 15 miles and returned to a landing near the place of the takeoff, thereby marking the conquest of the flier's worst enemy—fog.

When the Daniel Guggenheim Fund for the Promotion of Aeronautics was established, one of its purposes was to obtain all information possible regarding fog. In a statement marking the successful completion of Doolittle's flight, Harry F. Guggenheim, president of the fund, declared:

"It is significant that the achievement is realized through the aid of only three instruments which are not already the standard equipment of an airplane. In other words, with the commercial manufacture of these instruments, the necessary equipment for fog flying will be neither expensive nor complicated, but of such a nature that it is readily available to the average pilot and easily comprehended. The commercial practicability of the development is therefore assured from the start.

"Lieutenant Doolittle has been in

(Continued on page 58)

Big Leagues May Travel by Air

BASEBALL teams of the future will travel by air to save the players from travel fatigue and to speed up the playing schedules, according to Rogers Hornsby, picturesque manager of the Chicago Cubs.

"I have watched the development of commercial aviation from my front porch during the last three years," Hornsby said. "Three years ago only mail planes used Lambert-St. Louis field, which was then only a large strip of flat ground with a creek running through it and bordered by a couple of tin hangars.

"Today planes fly over my home every hour of the day and night. I travel by plane whenever possible and some day I am going to learn to fly my own ship.

"The day will come when all teams will use air transportation. Plane travel will eliminate off days and lessen

Rogers Hornsby (right) discusses aviation with Col. Halsey Dunwoody of Universal Airlines.

the ill-effects of constant long distance travel on the players.

"Long hours aboard a railroad train have a decidedly bad effect upon a trained athlete, as any manager or trainer of a professional or amateur team will bear me out, and days lost in travel are expensive days according to the business office. One of the largest items of a baseball club's expense is travel cost."

Curtiss Robin Crash Kills Veteran Pilot

EARNEST ROBINSON, 40, a pilot for the Columbia Airlines, Inc., was killed at Lawrenceburg, Tenn., on March 14th, when the Curtiss-Robin cabin plane he was piloting failed to come out of a tail-spin.

Robinson was a native of Hampton, Canada and had been leader of the 94th Squadron of the Royal Air Forces. He was a holder of the Croix de Guerre, having received it two days before the Armistice was signed.

He had 4,000 flying hours to his credit, and held a U. S. Transport license.

XUM

The Swanson Coupe Has Ingenious Cantilever Wing

The Swanson Coupe (left) is an attractive two-seat cabin monoplane. Below, excellent vision is obtained because there is no front spar passing through the cabin.

THE Swanson Aircraft Company, Inc., is now producing its two-place cantilever cabin monoplane known as the Swanson Coupe. This model, recently approved by the Department of Commerce, is powered by the 110 h. p. Warner Scarab engine.

The Swanson Coupe is unique in that its cabin construction is arranged to give full view from above, by the design of a special and particular effective wing truss. This truss is designed to allow the anchoring of the wings in such a manner as to dispense with the use of a continuous front wing beam extending through the cabin.

The dual controls are so designed that practically no time is consumed in either installing or removing the student controls, and the side by side seating arrangement is of particular and distinct benefit in giving flying instructions.

The cabin has a wide door on either side with adjustable glass windows. It is luxuriously upholstered and finished in Chase mohair fabric.

The Swanson Coupe is offered in two models: Standard and DeLuxe. The equipment of both models consists of dual controls, low pressume semi-balloon tires, and laminated safety glass, in addition to the usual instruments and controls. The DeLuxe model is equipped with electric starter and additional accessories and instruments.

The Standard model is priced at $4,450, and the DeLuxe model at $4,985. Specifications and performance data follow:

Span	34 feet 4 inches
Height	7 feet 7 inches
Length overall	25 feet
Weight empty	1,400 pounds
Gross weight	2,050 pounds
Fuel capacity	40 gallons
Oil capacity	3 gallons
Useful load	650 pounds
Pay load	220 pounds
High speed	125 miles per hour
Cruising speed	95 miles per hour
Landing speed	40 miles per hour
Cruising radius	625 miles
Climb with full load	700 ft. per minute
Ceiling	16,000 feet

Is Gliding Possible Over New York?

GLIDER flights above New York City's towering buildings may sound fantastic, but the city has perfect glider air, and some intrepid soarer will conquer it in the near future, thinks Hawley Bowlus, designer of the Bowlus sailplane.

"I'm sure the rising currents produced by the tall buildings of New York and the currents from this vast heated area provide an upper air in which a glider pilot could remain aloft almost indefinitely," said Mr. Bowlus.

"The number of good places for gliding and soaring close to New York City have surprised me. In almost every direction there are sharp rises of hills that are ideal for the sport.

"Everyone who's tried it seems to agree with me that it's more fun than tobogganing or motoring or sailing. The speed and silence and serenity of a glider's movements through the air give you a thrill all their own. If you don't exceed the limits of safety, which are very well known, it's a perfectly safe sport."

The First Woman Pilot

THE field of aerial navigation was first invaded by woman, in the year 1798, when Mrs. Blanchard, wife of the French aeronaut, Francois Blanchard, accompanied her husband on many of his balloon ascensions and voyages.

Francois Blanchard was born in 1753 and became one of the early aeronauts. He won distinction by crossing the Channel from Dover to Calais in January, 1785, with an American (Dr. Jeffries) as a companion. For this feat he received a pension from the French king.

He made many remarkable ascents in various parts of the world, for which he used a balloon of the Montgolfier type and inflated with hydrogen gas.

For ten years, following the death of her husband, in 1809, Mrs. Blanchard continued making ascensions and voyages for both exhibitions and scientific purposes and was killed when her balloon took fire in 1819. The cause of the fire was attributed to friction-heat resulting from the chafing of ropes.

Adventures With a Rhon Ranger

CECIL HARTLEY, of Talent, Ore., has learned a lesson about gliding. He tells of his experiences as follows:

"Having completed my Rhon Ranger, I was ready one warm afternoon to try my wings for the first time.

"We carried the glider out to a field about 500 ft. long and practiced towing on the ground to get used to the controls. Before the sun set that day I had lifted it off the ground about two feet on several of the trips.

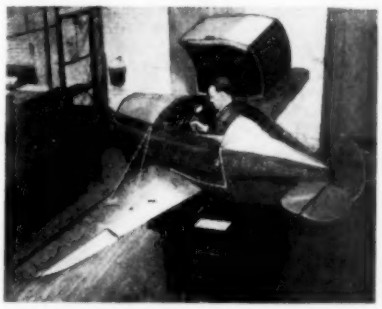
"The next day we moved to a field about 1,500 ft. long and did some real flying. I found it very easy to control once off the ground and so I took on altitude in large quantities until about 40 feet had been attained on several of the flights.

"I was having the time of my life until on one flight I decided to try turning a little bit. I was paying too much attention to the turn and forgot to release from the car until it was almost to the end of the field which is surrounded by a barbed wire fence.

"Almost as soon as I released I knew I would not be able to stop before hitting the fence. I nosed it down into a much too steep glide and hit the ground with a jarring thud and bounced up into the fence. When I crawled out of the wires I found I had a broken foot which has put a stop to all my gliding for a while.

"A careful check showed nothing wrong with the glider but a small tear in the fabric. A good demonstration of the stout construction of the Rhon Ranger."

Trainer Teaches Blind Flying



THIS machine for teaching pilots how to "Fly Blind" was recently demonstrated in New York.

It is like a miniature airplane. It has the same controls and is subject to the same reactions as a plane in flight. The cockpit is covered by a detachable hood, which closes down over the student pilot so he must handle the machine by the instruments alone.

John D. Peace, Jr., Pioneer Instrument Company engineer, is shown in the device.

It is claimed that the machine will save many hours of expensive flight instruction for advanced students.

John B. Rathbun Dodges Brickbats!

Whiz! Wham! Bang! "Fire away," roars Rathbun as he stands his ground against the verbal onslaughts of his critics. Mr. Rathbun adroitly answers objectors to his March article "The Years Go By—but Aviation Stands Still."

AFTER reading the shower of letters that followed the publication of my article, "The Years Go By But Aviation Stands Still," in the March issue, I got quite a kick out of the many comments that were made for and against my contentions.

Counting noses on a rising vote, opinion is divided about fifty-fifty upon the momentous questions raised in the aforesaid article, some agreeing with the author that the improvements have been insignificant, while the other half to the argument are laboring under the belief that the airplane has been revised, body and soul, during the past few years.

While I anticipated a lot of comment upon this article, I was quite astonished at the number of letters written in by our readers who evidently are dyed-in-the-wool aero fans.

Now, before we get down into the controversial details, let us look at the total results attained after the past few years of alleged improvements.

Statistics show that accidents are on the increase, even since a paternal government has taken over the supervision of aviation. Figured in total whole numbers or computed as a percentage, it cannot be denied that the present highly improved ships indulge in more crashes than in long years gone past.

And again, if aviation has been so completely revised in the last few years, why is it that the same old standard 1916 controls are still installed in the ships, when admittedly, the principal defect of the ship has always been its difficult manipulation or operation? I defy my opponents to laugh these two facts off.

As I write, I have a copy of the "British Standard Exporter" in front of me, published for the years 1920-1921. It was the purpose of this volume to dispose of the surplus aviation war stocks of Great Britain to other nations, and this ponderous volume is literally filled with the most intimate details of wartime ships and of ships dating back to 1916.

Turning the pages over, one by one, we repeatedly find details considered as novel on current ships. Take the most modern of modern ships with its new fresh varnish and you will find its counterpart in the British Standard Exporter of 1920-1921.

Selected at random we find the following items in this venerable book: scores of radial engines, streamlined chassis, "bloop" biplanes just like the latest Laird edition, the Vickers "Vimy" that first flew the Atlantic, the R-34 transatlantic dirigible, retractable chassis, tubular steel construction, a number of triplanes, large transport planes that present decided advantages over present ships, folding wings, folding fuselage, slotted front edge wings, and a multitude of other details that are believed to be modern improvements by the beginner in aviation.

All of this goes to prove that the present designer ignores past inventions and then goes on re-inventing things that have been tried before.

AND now let us discuss things with our correspondents. First we have Mr. Henry Hunt of the Hunt Aircraft Manufacturing Company, Fiskeville, R. I., who writes as follows:

"It is with interest that I read your article in POPULAR AVIATION, March issue, 'The Years Go By But Aviation Stands Still,' and I certainly agree with you.

"I gave a talk Feb. 4th last, to the Providence Engineering Society in Providence, R. I., on the subject of the 'fool-proof plane,' and at that time deplored the lack of progress we have made in aviation since the original Wright experiments, of which I witnessed many.

"True, we have better and more reliable motors, but the airplane has only been refined and dressed up, and certainly it is no more efficient than our early ships, and it is doubtful whether they are any safer, even considering that we have made advances structurally.

"Consider the quick take-off and climb of the old Wright Model 'B' airplane. These old ships were flown from fields so small that would not be possible with present modern planes, regardless of horsepower.

"This subject you have covered admirably, and I feel that you have the wholehearted support of the old timers who know, as you know, that the younger generation of designers are designing from a set formula (Dept. of Commerce helping) involving a standard airplane and hence all airplanes must comply with this set formula.

"During the last two years I have designed, constructed and tested two airplanes that are different. They are safer and more efficient than present day ships, and if you want photographs, specifications and results of tests, I will be glad to send them to you as I would welcome your comments. In closing I will say, 'keep the good work up'."

Thank you, Mr. Hunt. We old timers have gone through the years together, and having seen both sides of the question with our own eyes, might be presumed to know what we are talking about.

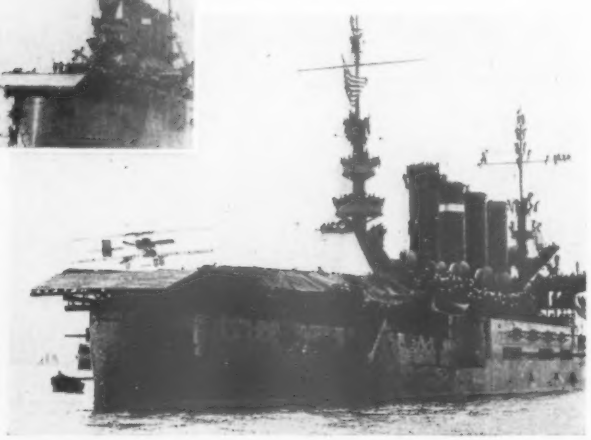
By all means, send POPULAR AVIATION complete dope on your two "different" airplane designs. Your recollection of the old Wright model "B" and its really remarkable performance cheered up my whole day.

And now we will have another one, representing the opposition.

"Dear Mr. Rathbun:

"Tho' I have the uncomfortable feeling of criticizing my betters, I nevertheless am compelled to enter a violent protest against your article in the March number of POPULAR AVIATION entitled, 'The Years Go By But Aviation Stands Still.'

"I think it was a mistake to say that aviation has not advanced simply because it has not forsaken all its old ideas and methods for the revolution-



Eugene Ely about to land on the U. S. S. Pennsylvania for luncheon. Above, Ely taking off. The landing platform was 32x127 feet, and this so-called modern stunt took place on Jan. 18, 1911.

ary. I know that I would hesitate to trust myself to the skies in a machine that was based entirely on spanking new ideas.

(a) "In the comparison of the 28 Nieuport and the Vought Corsair, the layman would probably favor the former, but when I look at it, I see an obvious lack of torsional and flutter bracing that made this pretty little ship a veritable death trap, while the Corsair with its widely braced wings and because of its ruggedly built 'gas-pipe' fuselage, can stand the loads of its big motor, deck landings into arresting gear and long power dives that would have torn your Nieuport to shreds and scattered to the four winds.

(b) "It would have been very unusual for a war-time motor to have kept a ship in the air for nearly a month, would it not?

This flying boat was successfully catapulted from the U. S. S. North Carolina in November, 1915.

(c) "What do you mean that the modern plane has not increased strength with increased power? We hear of very few planes being shaken apart by their motors. What of the Martin diving bomber, the Curtiss Helldiver, and the loops and the inverted flying of a Ford Trimotor?

(d) "Speaking of speed, a racing plane with 400 horsepower would attain a possible speed of about 150 in 1917, while Frank Hawks reaches 270 with the same power. This improvement could be brought about only through pure aerodynamic design.

(e) "And control? I am familiar with two locally operated planes, a Fleet and a Lycoming-Stinson. This Fleet can be flown almost indefinitely with the rudder only by an ordinary pilot. I was riding in the Stinson through extremely gusty weather and bumpy air. After each bump it would right itself instantly. The pilot used only the rudder pedals, he never touched the wheel control. This is only an example of what some of our good planes will do.

(f) "We have our esteemed 'old-timer' pilots and airline operators to blame for the still large amount of wooden frames, tail skids, fabric covering and other wartime marks on modern planes, but you cannot deny that advanced equipment is not being perfected and used more and more.

"Yours respectfully,
"Eugene O. Clay."

"P.S.—Who wants tailless sweepbacks anyway?"

WE ARE much indebted to Mr. Clay, who is a resident of Pomona, California. He has introduced so many examples in support of his belief that I have attached reference letters to the various paragraphs, and will answer them in the same order.

Mr. Clay, however, reflects the attitude of the present generation when he remarks in the first paragraph: "I would hesitate to trust myself to the skies in a machine that was based entirely upon spanking new ideas." This is not aimed at Mr. Clay, but to the whole kit-and-kiboodle of slide-rule fans and formula-mad designers of the present era who imagine they are making wonderful advances in a science by making a part two inches thick where it was one inch before.

Compare these formula hounds with the pioneers who, when possessed of an original idea went out and tried it, whether the books said that it was right or not.

I am as much a booster for a technical education as anyone, having been an instructor in mechanical engineering for many years, but there is a point in any science where hard-headed vision and initiative must supersede cut-and-dried rules of the X-square plus Y-square variety.

There comes a time in the life of an engineer when he places less and less confidence in this sort of thing and strikes out on the highways and byways of experimental science, leaving the old landmarks behind him.

And now we will take up things in the order that Mr. Clay has written:

(a) I never regard the 28-Nieuport as pretty. Perhaps it is, but I saw it rather from the standpoint of effective service rendered in the field and there is no criterion in this matter except actual trial—which the Corsair has never had.

Don't worry about power dives; this little baby had plenty of them with a hot German Wasp right on her tail, and I very much doubt whether the Corsair with tremendous weight and inertia (flywheelage) could have maneuvered half as quickly or as well.

There were a lot of ships of the big overpowered type on the drawing-boards of the wartime activity but it was fortunate that they stayed there. If the ship was too light, she stripped her wings. If she was too heavy and unmaneuverable, the pilot was pretty severely strafed.

(b) There has not been so very much development in airplane engine design as there has been advances in the materials of construction, the fuels and the lubricants, none of which can be claimed by aviation.

One trouble with the old engines lay

(*Continued on page* 53)

Captain Dollar Enjoys Flying

THAT venerable old seaman, Capt. Robert Dollar, whose steamships ply into every corner of the globe, has had his first experience with the new kind of ships which have wings instead of keels and ply the air instead of water.

"While I was in Shanghai I decided to take my first airplane ride," said Capt. Dollar.

"Without telling my wife about it, I flew from Shanghai to Nanking, a distance of 200 miles, in two hours flat. It was a great experience.

"The next day my wife heard about my flight and she demanded that she be allowed to fly, too. So both of us climbed aboard the plane and flew to our hearts' content.

"It seemed that we were not going very fast, so I leaned over to the pilot and shouted: 'Give us more speed!' The pilot shouted back: 'We're making 100 miles an hour now!'"

Captain Dollar is in his 86th year, and has been identified with shipping for practically all his life. He is actively in command of the Dollar Line, of which he is President.

Recollections of the Sperry Messenger

THE recent passing of Elmer A. Sperry revives memories of his son Lawrence, who before his death while flying the English Channel was expected to rival his illustrious father.

Some years ago James F. Boyle, of Airships Incorporated, used to relate how Lawrence flew in his little "mes-

The Sperry Messenger plane.

senger" plane, designed by himself, and driven by an early L4 Wright engine, 3-cylinder, 60 horsepower.

"Sperry was certainly a picturesque figure in aviation," Boyle related. "He was a great big fellow and could hardly fit in his ship. Ke kept it in a shed at his house. He used to fly back and forth to work.

"He had a hook in the ground in his garage, to which he hooked the end carriage. He would start the motor by turning the propeller, and then get in the ship, pull a string to release the hook, and away he'd go.

"At the St. Louis Air Meet he landed on the sidewalk in front of the Chase Hotel. He was an expert flyer and everyone could not handle a ship the

(*Continued on page* 56)

Defying Death in

Barren Wastes . . . Howling Blizzards . . . Devastating Cold . . ALASKA! the land of adventure

by E. STOY REED

THE Alaskan aviator leads a hazardous and adventurous life.

In addition to his regular work, he often receives weird and unusual assignments. Such as carrying prospectors to unexplored regions. Hunting for lost and frozen men. Locating passes through mountain ranges. Directing schooners through the ice, and even herding reindeer.

Besides this, hardly a week passes that he is not called upon to rescue some injured prospector or trapper out in the wilds. Ever since Ben Eielson first set the example by transporting in his plane a desperately sick man, who would have died had he been carried "over the trail" by dogteam, hundreds of rescue flights have been made in Alaska.

One of the most dramatic of these emergency trips was made by A. A. Bennett into the Chandalar, where is situated the farthest north gold camp in the world.

Here two men named Shaw and Dunlap were testing fuses one night in their cabin. They noticed about eighty caps lying on a table nearby but thought they were far enough away for safety. However, a spark escaped and set the caps off. In the ensuing explosion both men received the full impact of the mass of burning metal in their faces and were at once completely blinded.

They lay helpless and groaning on the floor and would have died if a miner from some distance away had not happened to drop in on them that night. He found them so terribly injured that he did not dare leave them. So he scribbled a note and tied it to the collar of his "lead" dog.

How he ever made the animal understand that he was to go for help, remains one of the mysteries of the north. But this malemute climbed across a mountain range to Little Squaw mining camp, twenty miles away, where the note was read and a dogteam dispatched to bring in the blinded men.

Though no airplane had ever been up in the Chandalar before and there was no landing field there, an urgent appeal was telegraphed in to Fairbanks. Pilot Bennett started out in fog so thick that he found his way to Beaver, the half-way point, only by flying ten or twelve feet above the Yukon River.

Stormbound there many days, he at last set out through the mountains. It was snowing so heavily that he could not see the earth at five hundred feet. Hugging the ground, he flew up and down branching creeks, perpetually in danger of crashing into a mountain, feeling his way to the frozen lake at Little Squaw.

"If I ever saw a happy bunch of men in my life," said Pilot Bennett later, "I saw them then. The feeling there was that 'God had sent an angel' and that was the expression they used. Every mine had closed down and the men were working in crews of twos, taking care of Shaw and Dunlap. It was forty below zero that day, and as the plane was only an open two-seater, the only one I had at the time, I did not feel like exposing the injured men to such severe cold.

"Next morning it was a little warmer, so we started out. I had not flown two hours before a sixty-mile blizzard hit me, forcing me down in a hurry. I just managed to spot a small cabin before my view was cut off by a solid wall of wind and snow. How I brought my ship down beside that cabin, only heaven knows."

On bursting into the hut, Bennett found that the occupant was away, leaving him without any possible help. Although spare of build himself, he lifted his two fur-clad charges from the plane, one of them weighing at least two hundred pounds, and carried them into the cabin.

For three days they were marooned in this trapper's shanty. Built of moss-chinked logs, with only a Yukon stove inside and a stove-pipe of tomato cans telescoped together, it offered very little resistance against unbelievable fury and death-dealing cold of the blizzard, which swept down upon them from across endless stretches of wilderness.

During those three days Bennett contrived somehow to feed the two helpless men, to care for their eyes, attend to their wants, and to rustle firewood as well, to keep them warm.

Left—How would you like to fly over this country? A typical stretch near Juneau. Below, a Russian Junkers, the first Russian plane ever to reach Fairbanks.

Frozen Alaska

Tales of Glory and of Heroism out of the Great North.
The rescue of doomed men . . . the capture of criminal fugitives . . . all within the line of duty of our Alaskan flyers. Thrilling true stories of adventure that will curdle your blood.

Anyone knowing this pilot, with his half flippant, half "hard-boiled" exterior, would find it hard to imagine him in the role of an "angel of mercy." But afterwards in the hospital, the two men said: "No one could have been kinder. We owe our lives to Bennett."

The storm died down at last, but in the dead calm that followed, it was fifty degrees below zero. Bennett did not know whether the make of plane he then had would fly in such a low temperature. However, driven by desperation, he gassed the ship, heated the oil which he had drained on landing, and under a canvas hood warmed the motor with a blow torch to about ninety degrees.

Then he packed Shaw and Dunlap down in their seat and covered their faces with fur. The snow had crusted, enabling him to take off easily with his skiis. He nosed the machine sharply upward with wide open throttle and in this way kept the engine from freezing until he succeeded in reaching an altitude where it was only thirty below.

He groped his way to Fairbanks through the perpetual fog with which interior Alaska is blanketed during severe cold. That afternoon the two suffering men reached at last what seemed like heaven to them, two warm beds in St. Joseph's Hospital at Fairbanks. Dunlap never recovered his sight. Shaw, however, regained the use of one eye.

MANY instances, such as the following, are remembered in Alaska of Bennett's never-failing resourcefulness in an emergency.

One day, owing to an exhausted oil supply, he was forced to land near an Indian village. Somewhat disconsolate at his predicament he walked into the big community log cabin, where four or five families lived. He began to wonder how in the world he could ever get back home without any oil.

One of the squaws was making pastry. She was kneading into the flour that favorite Alaskan brand of lard, bear grease. The aviator, as he watched, was seized by a sudden inspiration.

He jumped up and took the can from her, exclaiming: "You sell me bear grease. I pay you heap plenty!" Then he set it on the stove. When it was melted, he added it to his depleted oil supply and continued on to Fairbanks!

At another time he made a forced landing in the interior at forty below zero. The skiis, fusilage, radiator and one wing, were broken. He mended the broken wing with willow limbs and gunnysack twine. The fusilage was made "just as good" with baling wire and willows.

He packed the engine to a roadhouse, three miles away and rebuilt it with a hammer, cold chisel and monkey wrench. Then with his passengers, he walked twenty miles to their destination. Returning, he started out in his airplane for Fairbanks, accompanied by one lone, chance-taking passenger. With a leaking radiator, one cylinder out of commission and fire spouting from the exhaust, Bennett crawled back, barely clearing the lowest passes. In a popping, sputtering, fluttering, barely moving ship, he just made the home field!

Frank Dorbandt, versatile Alaskan trail-blazer, remembers as one of his most unique experiences a reindeer round-up which he conducted by airplane. Nine thousand deer were missing in northern Seward Peninsula.

Twelve men had been out looking for them for three weeks. Dorbandt flew over a high range of hills and at last located the runaway deer. He found them scattered in little bands, far and wide over the vast, treeless tundra, some up on hills, others down in the valleys.

"One mountain top, as I flew alongside of it," explained Dorbandt, "looked as if it had suddenly sprouted a forest. A herd was standing there gazing at my plane. Their enormous, branching antlers looked like trees outlined against the sky.

"When I discovered how frightened these animals were of my plane, I decided to attempt driving them with it. Swooping low over each band in turn, I started them one by one, down on their way towards a great plain, where the main herd was already gathered.

Right, the town of Skagway. The famous White Pass is in the distance. Below, A. A. Bennett taking off from the Chandalar landing field.

Terrified by the roar of my engine, they would try to escape by galloping ahead of me.

"As reindeer generally travel in a straight line, all I had to do was to start them off in the right direction. In an hour and a half I had the whole herd of nine thousand rounded up. Then I flew over to the coast to get the owners."

ONE of the most spectacular flights in Alaska was made by Ralph Wien, the brother and pupil of Noel Wien.

With only eleven hours previous solo flying, he flew across Alaska to save a mail contract when his brother was missing at Point Barrow. Though he had been over the route twice before with Noel as a passenger, he had never as yet set his plane down on any other field than the one at Fairbanks. On this three-day trip he made ten successful landings on unfamiliar fields, fields which were both rough and small.

Noel Wien is one of the greatest living Alaskan aviators. Numerous tales of skill and daring center around his name. Of his many hazardous trips, one of the most exciting was his pursuit of a criminal into the wild and unknown Endicott Mountains.

In March, 1928, a trapper snowshoed many miles into the Indian trading post of Fort Yukon to swear out a warrant against another trapper who, after staying with him in his isolated cabin, had escaped into the mountains.

As it was impossible to follow him by dogteam at that time of year, the Assistant District Attorney of Fairbanks, to whom the case was referred, decided to attempt pursuit by airplane. Piloted by Noel Wien in the Hamilton monoplane which was afterwards wrecked in Siberia, he flew to Fort Yukon, where he conferred with the marshal and the plaintiff.

The trapper drew a rough map for them of the terrain as far north as his cabin on the Coleen River. Of the country farther north nothing was known. As the accused man had escaped into this unexplored region it seemed futile to ask Wien to go after him.

They were about to give up the case when they happened to think of a strange band of Eskimos who had come into town the day before. The first of their kind ever to appear in Fort Yukon, they had created a great sensation, especially among the Indians. It turned out that one of these Eskimos knew a few words of English.

On being questioned, he admitted that he had seen a white man in the range. This man had sought shelter with their tribe during a blizzard and for all he knew, might still be camping with them. He said that his tribe had come from the Arctic Coast the year before, crossing the Endicott Range through a pass unknown to white men (Barter River Pass). The southern entrance to this canyon was marked by a great "Black" mountain. The wanderers had found fox and caribou plentiful here and had established a temporary settlement.

"Do you think you could locate this 'black mountain?'" asked the Assistant District Attorney, turning to Wien. "Would you care to risk such a hazardous trip?"

"I'm game if you're game," replied the aviator. "We will gas up here and if we can't find any place to land in the range, we may still have sufficient gas to return."

The local commissioner refused to fly. This necessitated bringing the prisoner and witnesses back with them.

Frank Dorbandt dressed for a brief winter joy-hop in Alaska.

Wien pulled out at noontime, carrying the trapper as a guide, the local marshal and the Assistant District Attorney. They left behind them a duplicate of the trapper's map and the instructions: "If we are not back by tomorrow night, wire for a plane from Fairbanks to go in search of us."

Wien flew northeast, following the flat, wooded stretches of the Porcupine River almost to the Canadian border. Then he turned north of west up to Coleen. That river lead them into the rugged foothills of the Endicott or Arctic Range. The only possible landing places below were occasional lakes, which were still frozen, although it was nearly May.

At last, just before they reached the timber line of northern Alaska, the trapper pointed out his cabin beside the frozen river. Then they headed for the range, which towered before them as unknown and forbidding as the mountains of another planet.

Wien at first tried following the Coleen to its source. Then, when this one landmark failed him, he struck out blindly, flying at a great height across a maze of treeless, snow-capped mountains, bound on the seemingly hopeless quest of singling out the "black" peak from among hundreds of thousands of peaks.

When they had gone about ninety miles they saw a great pass leading towards the Arctic. It was guarded on the south, not by one, but by three mountains, which appeared "black" compared to the surrounding country because windstorms had almost denuded them of snow.

Although this scene did not fit the Eskimo's description, Wien circled the nearest of the three peaks and then went on to the next one. He was about to fly over this one also and give up the search, as it was growing late, when he happened to notice some dark spots on the snow beneath.

He circled lower suspiciously. Then he was amazed to see tiny black figures running from round, snow-covered huts, which were invisible from the air. He found out afterwards that the dark spots which had attracted his attention were where staked dogs had trampled and packed down the snow. As the snow-covered village itself was indistinguishable from the surrounding country, it seemed a miracle that he had ever found the place.

About a mile away, on a plateau near the summit of the mountain, was situated a smooth, rounded knoll. Wien flew very low over this several times to see if there were any rocks jutting up from under the snow. Then he motioned to his passengers that he was going to attempt landing. While they braced themselves against the shock of possible disaster, he landed at the foot of the incline. When the giant monoplane stopped taxying, there they were perched on the very top of the knoll!

The Eskimos began running out towards them. But halfway to the plane they stopped. Nothing could induce them to come any closer to this terrifying monster of the air.

On stepping out into the snow, everyone sank to their knees. Though the crust held up the Hamilton, which was supported on broad skiis, human beings could not walk through it. The party donned snow shoes and made their way over to the Eskimos, who, with sun-blackened faces and rough fur clothing, were a very wild and primitive looking species of man. They had children with them, and one of the squaws carried in her parka hood a baby not more than a few weeks old.

"WE COME for whiteman," said the marshal, trying to make the staring natives understand by sign language. At last a glimmer of understanding dawned in the slit black eyes of one of them, who knew a few words of English. He pointed beyond the village of skin tents.

"Whiteman go," and he made motions that they had driven the man out of their camps.

"How far he go?"

"Not far. Wind he blow," he held up five fingers and whirled his arms to illustrate a terrific blizzard, and then pointed to the sun, giving them

(*Continued on page* 60)

Army Bombers Have Perfect Aim

THE 11th Bombardment Squadron, Rockwell Field, has a record bombing team in Lieut. H. W. Bowman, pilot, and Lieut. R. K. Urban, bomber. They were sent aloft to drop their bombs for record score. And what a score they made!

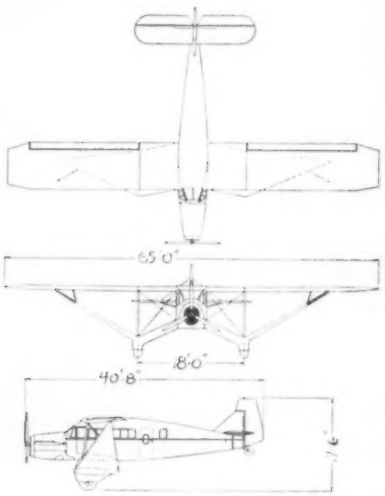
Lieut. Urban dropped a bomb for his sighting shot. It landed in the middle of the circle—bullseye! In five more approaches at the target the five record bombs were dropped with every one landing in the center of the target—score 500! Two bombs, spares, remained, so with two additional approaches two more bullseyes were scored.

Officially credited with a perfect score of 500, Lieut. Urban set a super record when all eight bombs suspended in the racks of the "Condor" found their mark with unerring accuracy.

Scale Drawings of the Bellanca "Airbus"

THE scale drawings of current plane models have won quite a following among model builders.

This month we have selected the Bellanca "Airbus" (described in Nov., 1930, issue). It is a single motored sesquiplane with a top speed of 147 m. p. h. The lower stub wings act as a lifting surface, as well as a bracing strut.



Veteran Flyer Establishes Record By Mistake

L. D. MILLER, veteran flyer and test pilot, stepped into the harness of his parachute, buckled the straps about his legs and shoulders, climbed into a shiny-new small sports biplane, pushed the throttle forward and was off!

Little did he know that before he again placed his feet on Mother Earth he would have set a record that, while not entered in the books at Washington, still stands untouched and is the topic of conversation throughout the Middlewest.

Miller's job on this particular day was to test fly this newly designed and newly completed airplane. He had flown it before. Inspector Jacobs of the department of commerce had witnessed the flight. Slight changes had been recommended by the Inspector, and these being completed, he had returned to the Council Bluffs, Iowa, airport to again watch this diminutive plane fly. If satisfactory he was to recommend a government rating for the plane to allow the owner to place his ship in production.

Prior to the take-off, Miller had received his instructions from the Inspector. They were well known to him, as he had heard them many times before, but he had listened attentively.

"Take it up to 7,000 feet; spin it twice to the right and then twice to the left; then four times to the right and four times to the left; then six times to the right and six times to the left. Never start your spins below 7,000 feet," the Inspector warned him.

A small crowd of onlookers had gathered at one corner of the field to watch the flight. In front of the hangar mechanics, students, the designer, and the owner were gathered about discussing the flight.

The owner and the designer both showed signs of nervousness. It was the tension and not their lack of confidence in their flying brain child. One and one-half years work and more than $40,000 was represented in that trim little craft. A great deal was at stake on the success of the flight.

The purr of the motor was no longer audible to those on the ground and field glasses were brought into play to follow the great circling course of the small plane as it sped skyward to gain altitude before starting its spin test.

"There, he's started!" one of the students ejaculated, as the flash of midday sun caught the wing tip of the plane and made the turns easy to count.

L. D. Miller, Test Pilot.

One, two, three—was he going to make all six spins to start with? Many things flashed through the minds of those on the ground in those split seconds while the plane continued downward into its fifth and sixth turn.

In the cockpit Miller was frantic for the moment. He admitted it later. In vain he struggled with the controls but the ship refused to respond and bring its nose on a level with the horizon.

Miller had flown every conceivable make of airplane in his thirteen years of flying, had many a forced landing, flown through fog thick enough to cut it with a knife—and a hundred of other things common to the old timers, but this was the first time he found he was unable to right his plane. He came to his senses following his momentary fright before the plane had completed its sixth turn. He unbuckled his safety belt.

On the ground all eyes were glued on the little plane. Through their glasses the onlookers could see Miller leave the cockpit and step to the wing. For a moment it looked as though the plane was about to right itself with the transfer of weight out of the cockpit. Miller climbed back into his seat.

Nine, the tenth, and now the eleventh spin and the plane continued its downward course, the sound of the motor could now be heard by those on the ground. Again they could see the pilot leave his seat in the cockpit and poise on the edge of the wing.

Again the ship widened its spin into a tight spiral and a sigh of relief issued from the ground crew as they thought the plane was about to right itself. Miller had returned to the cockpit for the second time. But the weight in the pilot's seat again brought the plane into its spin.

Fifteen, sixteen, those on the ground counting the spins muttered. The seventeenth again saw the pilot leave his seat and stand on the wing. To those on the ground the plane looked to be

(*Continued on page* 58)

Autogyro Makes Delivery at Sea

HOVERING a few feet above the deck of the liner ILE DE FRANCE in an autogyro, James Ray of the Pitcairn Company successfully passed a package from the plane to the captain of the liner while both ship and plane were cruising along at sea.

The transfer was the first of this type ever attempted and was pronounced a success by all concerned. The flight was arranged by Paramount Sound News as a means of rushing last minute newsreel pictures to England.

Shortly after the ILE DE FRANCE had left her dock, the pictures were received from the West and were rushed to Miller Field, where the autogyro was being warmed up. A few seconds later and the windmill plane was headed out to sea at more than a hundred miles an hour. Just before reaching Ambrose Light the pilot picked up the ILE DE FRANCE.

Heading the plane up into the wind, Ray throttled down until the speed of his plane barely equaled that of the ship. He then allowed it to settle, and without losing his position just above the stern of the liner, he dropped from an altitude of some four hundred feet down to a bare forty feet above the deck.

The cans of moving picture film had been securely wrapped and weighted, and each was fastened on the end of a hundred foot length of cord. These Ray rapidly lowered over the side of his plane, at the same time jockeying it to hold its position above the deck. Below, the captain of the ILE DE FRANCE received each can without any trouble as it was swung down to him.

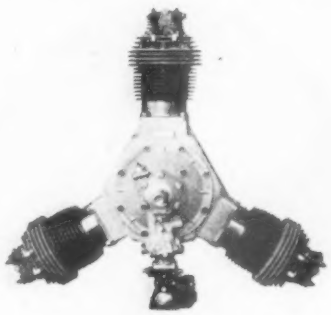
As soon as he had signaled that the entire transfer had been made, Ray stepped on the gas and landed safely half an hour later at Miller Field. The ILE DE FRANCE meanwhile ploughed steadily on towards Europe carrying the picture shipment which had just been made in one of the most novel fashions ever attempted.

The New Szekely Engine

THE Szekely SR-3, Model O. engine has received Approved Type Certificate No. 70, with a Department of Commerce rating of forty-five horsepower at 1,750 r. p. m.

The weight of the engine is 140 pounds with all equipment except propeller-hub—and this equipment includes either Bosch or Scintilla dual magnetos, Stromberg carburetors, spark plugs, ignition wires, tachometer drive take-off and propeller-hub.

These engines are slow speed engines,



A view of the 3 cylinder 45 h. p. Szekeley engine.

operating most efficiently between 1,500 and 1,800 r. p. m., with an average cruising speed of approximately 1,600 r. p. m. They are free from vibration, a quality of utmost importance to builders of light ships. They are radial in type and conform to the generally accepted appearance of aircraft engines.

Go Slow! Airplanes Ahead

THE first airplane crossing sign in the world has been erected in Southern California along a street bordering the end of the main runway at Grand Central Air Terminal, Glendale, California.

Many planes cross this street each day, gliding to land at speeds approaching fifty miles an hour.

The pilots always clear the avenue by a safety margin of several feet but the airport officials believe the signs will keep automobile drivers from becoming startled by having a huge airplane zip unexpectedly overhead.

The signs are the usual railway crossing posts, having white cross arms on which is lettered, *"Airplane Crossing—Stop, Look and Listen."*

Wanted: More Men Like This

HERE'S one some of you hard-boiled barnstormers won't believe.

I took a fellow up one beautiful afternoon to about 3,000 feet where he could get a wonderful view of the surrounding country (and, believe me, that's real scenery up there in the Berkshires).

When we came down and he went to pay me he said, "Gee, you don't charge enough," and he gave me two bucks extra. Just imagine!!

—*B. S. Brokaw.*

The Flying Opera

PROBABLY the only aircraft company that has its own grand opera troupe is the Sikorsky Aviation Corporation. Recently members of the Sikorsky company presented *La Traviata* with great success.

Mme. Boris Sergievsky, wife of the chief pilot of the company and a former member of the Russian Imperial Opera, sang *Violetta*. Her husband, who holds four world's records for speed and altitude for seaplanes, made his operatic debut as *Alfred de Germon*.

The cast was composed entirely of members of the World and Civil Wars Russian Veterans Association of 1914-1920. This organization was formed by a group of White Russians under the leadership of Igor Sikorsky, who emigrated to the United States after the Bolshevik revolution and engaged in manufacturing airplanes.

Curtiss Lightplane Reported Burned

LAST month, POPULAR AVIATION as well as several other aviation magazines carried the announcement of the new Curtiss Junior lightplane.

Newspapers gave the new plane wide publicity when Casey Jones flew the

A photograph of the Curtiss Junior released by the factory publicity department.

first model from the factory in St. Louis to the Curtiss field at Valley Stream, Long Island. Here, aviation leaders were invited to inspect the plane that was to revolutionize the industry.

And then we picked up a newspaper of March 12th.

There, hidden away in the middle of Walter Winchell's daily column was one little sentence. All it said was that the much-heralded Curtiss Junior plane had burned up at the Valley Stream airport and that the newspapers had not reported the fact.

We recalled a previous occasion when mechanics at Curtiss Field had burned a plane in a futile attempt to cover up a fatal crash, so we decided to investigate this new report.

Accordingly we sent the following telegram on March 13th:

Curtiss-Wright Flying Service,
Valley Stream, L. I., N. Y.

Curtiss Junior reported burned. Please verify and supply facts.

POPULAR AVIATION.

At the time of going to press (March 25th) we have not yet received an answer to our telegram of March 13th, and we are therefore unable to tell you what caused the fire if one actually did occur.

Mythical Horrors *of* Ground Strafing

The boche airman swooped down out of the sky, mowing down the helpless infantry!
"Rot," says this author, "it doesn't happen that way."

by J. N. MARTIN

A scene from the famous war picture "Wings." This article explains why this scene is not true to life.

IT WAS realistic enough to give me a fit of the old nerves. There on the screen in front of us was the infantry column going up to the front in much the same confused fashion I remembered so well. An occasional shell burst failed to cause more than local confusion. Well, one got used to that sort of thing in the infantry.

And then it happened! With a vicious roar that is like no other noise on earth and with twin machine guns spitting their leaden staccato, a German airplane appeared over the tail of the column, flying so low one almost expected its landing gear to touch the soldiers' heads.

Quite slowly and deliberately the boche airman followed the road the whole length of the column, throwing the ground troops into wildest disorder, spreading wholesale death along every yard traversed.

This demon strafer was equally at home when the troops were in the trenches. Selecting a straight section, he would swoop down out of the skies to within a few yards of his helpless targets and mow down platoons of infantry in a manner to remind one of the poet's description of British casualties at Bunker Hill. The dead lay "in windrows, as a mower rakes his hay."

So when we left the theater, I turned to my friend Ingraham, formerly First Lieutenant C. L. Ingraham, air service, with questions that had bothered me ever since I saw my first war movie.

Ground strafing is an unpleasant experience for infantry whether it takes place over a trench or over a highway, but I had my doubts concerning the wholesale fatalities.

Ingraham gave a disgusted snort when I asked him about it.

"Ground strafing? well, yes, I saw a lot of it and did some myself, but it's absolutely all wet the way they show it on the screen and write about it in the war fiction magazines.

"As a matter of fact, I doubt whether machine gun fire from strafing airplanes ever did much damage to the infantry, any more than rifle bullets and 'archie' guns ever seriously damaged the airmen.

"Strafing had its merits, however. It was a serious blow at the *morale* of the ground forces and it had a sort of tonic effect on the *morale* of the pilots.

"This latter is a little hard to explain because strafing was a dangerous maneuver at all times, not on account or rifle fire from the intended victims, but because it necessitated reckless diving to a very low altitude and an equally reckless straightening out of the plane.

"Ships in war time weren't what they are today, you know. It was bad enough when we were obliged to put them under sudden stresses while flying high above the earth. When we were up there, if a wing chanced to go floating away, there still was time for miracles to happen, but to flash out of a power dive when just a few yards above the infantry was to gamble everything that your ship would hold together. Often it did, strange to say!

"Maybe the pilot's satisfaction came from the thrill of deliberately slapping death in the face. It acted like a bracer on the successful strafers, whatever the cause, and I personally always got a kick out of the stunt. Other pilots have told me they felt the same way—a sort of useless gesture, perhaps, but a satisfactory one.

"The reason movies give the wrong impression of ground strafing is that a duplication of the real maneuver would not afford the audience a thrill. It's all over too soon and there's practically nothing to see.

"A pilot preparing to strafe must have plenty of altitude while picking his target and then must dive suddenly at maximum speed. If he flies too low, you see, the soldiers are aware of his intentions long before he can do any harm and the psychological effect is lost.

"And the actual strafe is a matter of split seconds because he must flatten out at tremendous speed and get altitude again or crack up his ship. That's the technique of ground strafing—pick your target at a good altitude, dive on it like a demon, firing for all you are worth, straighten out just at the point where another few feet would mean certain death, and climb again as fast as you can.

"Remember the speed of an airplane, even in those days, and you can imagine how many effective shots a pilot could hope to make at a ground target. It certainly was nothing like the leisurely, methodical, wholesale slaughter you see in pictures or read about in some of the war fiction magazines.

"No, I don't remember any very spectacular incidents of ground strafing," added Ingraham, "but I *did* have a queer experience with a couple of German air snipers near Luneville in the Toul sector. They weren't exactly strafing and their tactics were more like what you see in the movies.

"Maybe I ought not to say anything about it, even so long after the war, because these boche aviators were shooting at stretcher bearers who were trying to get the wounded out of the bloody territory around Mercy Farm.

"Still, thousands of troops saw the whole thing anyhow—and the Germans undoubtedly got the worst of it."

INGRAHAM waited as though in doubt whether I would care to hear the story.

"Go on, man!" I commanded.

"I want the low-down on this business of ground strafing and the more you can tell me, the better."

"Well," began Ingraham, "it was sometime in August and things were not especially hot around Toul just then for my outfit, the Ninety-seventh pursuit squadron, though they still were plenty hot for the ground forces.

"As I remember, the Forty-second and Twenty-sixth American divisions were there, with the Fourth coming up, and a whole lot of French were in the sector. I'm sure there were some Chasseurs Alpins and some Algerian colonials.

"By the way, those Algerians were wizards with their 'pig-stickers.' I had no idea lances could be used practically as combat weapons until I saw those boys chasing Germans through the woods around Chateau Thierry. I had a good view of it from the air. Lord! One of those Algerian lads would dart around a tree or a bush and poke a lance through a German as though the

boche had no rifle or bayonet at all and as methodically as a man might spear an olive with an oyster fork!

"The Ninety-seventh was quartered near the Toul airdrome. Most of our duty consisted of solo patrols. We would go out about daybreak and fly around until 9 a.m. or so whenever the weather permitted and sometimes do another turn in the afternoon.

"There wasn't any special activity in the air, though we'd have a scrap once in a while. Our chief business during the daily patrols was to get a line on enemy troop movements, flying fairly low for the purpose but not low enough for the noise of our ships to attract attention.

"I was pushing my one-seater along on this kind of duty one clear morning when I discovered two German pursuit planes flying unusually low and acting in a very peculiar manner.

"One of them seemed to be almost on the ground while the other was not more than five hundred feet above him. They were circling and banking at a great rate as though playing a friendly game of tag.

"I dropped to about two thousand or fifteen hundred to see what was going on, taking care to keep "in the sun" as much as possible. I had all the advantage anyway, except the two-to-one odds against me, and I figured that the upper plane was the only one I had to worry about at first as the other was in no position to do me any damage.

"I was already maneuvering for a dive on the top fellow before I realized what the boches were doing. Then I checked my preparations in astonishment. They were deliberately strafing stretcher-bearers! Medical corps men were dotted all over the field carrying wounded to dressing stations—and these two German pilots were making the job very unpleasant.

"This was decidedly different from a road or trench strafe. The stretcher bearers knew very well what was going on, but could do nothing except doggedly carry on their work, dropping the wounded and ducking for cover whenever the German nemesis picked out a particular group and swooped toward it, firing.

"It certainly was a miserable performance for the wounded and the stretcher bearers and I'm sure it must have been a terrible thing for the nearby Allied troops to watch but they couldn't do anything about, either, except to fire perfectly hopeless rifle shots at the bloodthirsty pilot.

"I couldn't stand much of it myself. There *was* something for me to do. Probably for all his shooting, the German did very little actual damage, but I happened to see him get a couple of men.

"I pointed the nose of my ship at the upper boche plane and came roaring down at him, opening fire as soon as I got him in my sights.

"I think my fire was his first knowledge that an opposing airman had

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JUNIOR ACTIVITIES
Edited by Paul W. Clough*

Bob Buck visits the President! Here we see (left to right) Bob's parents, Dr. and Mrs. Buck, Senator Kean, and then Bob himself next to President Hoover. Second from the right is Clarence M. Young, Asst. Secretary of Commerce for Aeronautics, and last is Senator Morrow, Lindy's father-in-law.

BOB BUCK, 17, of Hillside, N. J., former holder of the Junior Transcontinental record, recently returned from a fine round-trip flight from Newark to Havana. Bob made Havana in two days and after staying there about a week he made the return trip in one day, flying about thirteen hours. He used his J5 Pitcairn. Bob is planning another secret flight to take place soon.

* * *

Ed. Schneider, 18, another former holder of the Junior Transcontinental record, is still flying around in his Warner Cessna. His headquarters are at the Newark Airport.

* * *

Al Robbins, of Roosevelt Field, is going to be flying a Challenger Robin around the country soon. Al recently had a birthday so he is now 19. Also Al is growing a mustache, which we hope he will keep out of his soup. No matter where you are, you should keep on the lookout for Al because he is likely to turn up any place.

* * *

Victor Indrizzo, 20, of Brooklyn, recently received his Private Pilot License. He learned to fly at Barren Island Airport. Victor flew with Col. Fierro of Mexico in his Lockheed Sirius when he was at Barren Island last summer. He has been flying Barlings, Wacos, Fleets and many other ships.

* * *

We have a letter recently from Rod Clapperton who lives 'way up in Penticton, British Columbia. He is learning to fly in a D. H. Gipsy Moth. His instructor is "Barney" Jones-Evans. He had his first ride last summer in a Fairchild 71, when he flew from Victoria to Vancouver. That trip decided his future.

* * *

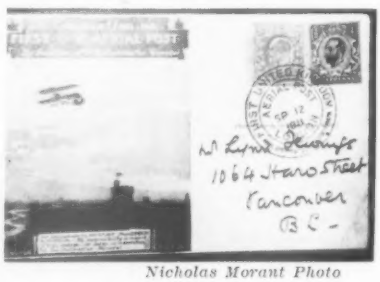
Another letter comes from Seth Sylvester, 17, of University City, Mo. He has been flying gliders and expects to learn to fly airplanes as soon as he finishes school.

* * *

We were also glad to receive letters from Clifford Teach of Sycamore, Ill., Harry Bauman of Brooklyn, Gus Daskalakis of Freeport, Ill., and David Strasinger of Newport, Ky. All of these fellows are planning to learn to fly soon. Harry Bauman, with three of his friends have organized an aero club. They are building a glider which is nearing completion.

* Private pilot. Holder of American lightplane altitude record for ships weighing less than 440 pounds.

Air Mail Stamps Valuable to Collectors



Nicholas Morant Photo

THE collection of air mail stamps is a new hobby which already has attracted thousands of enthusiastic followers.

Even more popular than the stamps, however, are the "1st Flight Covers." These are envelopes which are carried on new air mail routes on the first flight. Usually the Postoffice Department uses a special cancellation on such mail, thus giving it historical value.

One of the earliest of these covers is this postcard issued upon the occasion of the first air mail flight in Great Britain between London and Windsor. It was carried September 12, 1911, by Gustav Hamel, celebrated pilot of those days. It cost 6½ pence (13c) for the journey and is worth many times that amount today.

Wind Blows Two Ways

AN UNUSUAL situation was recently discovered when two Pacific Air Transport mail-passenger planes, flying in opposite directions on the Seattle-San Diego airway, passed each other near Eugene, Ore., both flying with tail winds of equal velocity.

Grover Tyler, flying the northbound plane at an altitude of 10,000 feet, had a 40-mile tail wind, and Russell Cunningham, passing Tyler in the southbound ship at an elevation of 3,000 feet, was also being speeded on his way by a 40-mile wind on the tail of his ship.

Thus we find that within 7,000 feet, the wind had completely reversed its direction.

I ATTEMPT TO BREAK THE JUNIOR TRANSCONTINENTAL RECORD—*by* Gerald Nettleton

The author photographed with his plane just before leaving Newark.

WHEN one flies from a fog bank at 9,000 feet into a sleet storm at 10,000 feet, with vision limited by the wing tips of one's plane, knowing that somewhere in the immediate vicinity are mountain tops ready to snag a lost aviator, then suddenly finds the plane going into a power dive, what does one do? My answer to the question, on Thanksgiving Day, 1930, was to bail out.

There was no hint of the excitement in store for me as I made my uneventful takeoff in my Warner powered Monocoupe from Newark, N. J., Wednesday, Nov. 19 on an attempt to break the junior transcontinental record. My route took me to East Saint Louis and then to El Paso, Tex., with stops along the way. Everything was running smoothly.

I left El Paso at 8:45 A. M. on a Monday morning, intending to fly the remaining approximately 600 miles that day to San Diego. But I barely reached Benson, Ariz., about 200 miles west of El Paso, when I had to land because of a broken rocker arm box. This was unimportant in itself, but proved to be the beginning of my troubles with the eventual sudden end to my flight.

The parts needed for the motor were ordered from Phoenix, Ariz. They arrived in time for me to get away from Benson the next day, Tuesday. Upon reaching Tucson, Ariz., I found the repaired parts not working properly, so I landed to wait until new parts were sent by air from Los Angeles.

I got away from Tucson on Wednesday, flying 310 miles to Imperial, Calif., in two hours and 20 minutes. Not being satisfied during this flight with the action of spark plugs put in at Tucson, I decided to stay overnight at Imperial while having the plugs changed.

Before leaving Imperial, 100 miles east of San Diego, on Thanksgiving Day, I receive word that the sky was clear at San Diego. My Warner engine was functioning perfectly and everything seemed ideal for a speedy finish for my nine-day flight. My elapsed time from Newark was 22 hours, 17 minutes. I had only 100 miles to go to beat Stanley Boynton's transcontinental time of 24 hours and three minutes. I felt sure of success and figured I could beat Boynton's record by at least an hour. So I took off from Imperial and headed over the last range of mountains that separated me from San Diego and a new junior record.

It was at 6,000 feet that the clouds became thicker and larger. Going to 7,000 feet I found myself flying blind. Flying conditions became worse, but I continued to climb, hoping to get above the clouds. It still was thick at 9,000 feet. At 10,000 feet I ran into rain, snow and sleet.

I had been flying blind for some minutes, the plane riding the storm nicely, when I started into a power dive. I throttled back the engine and managed to straighten out the plane. It was about this time that I discovered that the ship was headed east instead of west. So busy had I been with the controls, I had not watched the compass and noted my change in direction. Flying entirely blind now, it was a slow job swinging the plane around on its course again westward through the storm.

Sleet and snow continued to pelt the plane and visibility remained as bad as before. I knew that I was off my course, but had no idea how far nor in what direction. To add to my troubles, the turn and bank indicator had gone out of commission. The total of these difficulties resulted in my decision to bail out. A short distance westward, I knew, was San Diego and the goal of my flight which had taken me 2,650 miles. But I also knew that somewhere in my enshrouded vicinity were mountain tops which had no respect for ambitious young aviators.

Putting the ship in a normal glide and cutting the switch, I unhooked my safety belt, pushed the door open and leaped out head first into the storm.

(*Continued on page* 60)

Mysterious Signals Solved

A MYSTERIOUS plane of the night sailed in with the darkness from no one knew where. It swooped down over the little city of Alhambra, California, and flashed its ground lights in a series of baffling dot and dash signals that failed to make sense in any known code. Then turning its nose upward, it disappeared as mysteriously as it came.

The curiosity of all the town's inhabitants was aroused and finally an explanation was discovered. Here's what was going on:

H. J. Kelsey flies a commercial plane between Los Angeles and El Paso. He lives in Alhambra and arrives after dark. The signals are for his wife, who knows the schedule, and they merely tell her what friend husband would like to have for dinner.

Dot-dash means sirloin steak; dash-dot, liver and onions; and so on. It takes Kelsey about an hour to get back from the terminal, United Airport, fifteen miles further on, after flying over his home. When he arrives, the food of his choice is ready, piping hot.

Three Pacific Flights Planned

THREE solo Pacific Ocean flights—Los Angeles to Honolulu, Honolulu to Tokio and Tokio to Seattle—are planned by Tom Ash, former World War pilot of New York City. He intends to make the flights this April.

Power Glider Used as Trainer

A UNIQUE pilot-training system, using two identically equipped powered gliders was recently introduced at Los Angeles by its inventors, Dick Myhres and O. L. Woodson.

One of the planes has insufficient surface to leave the ground, while the other is capable of reaching an altitude in excess of 10,000 feet. As the picture shows, one can fly "rings" around the other, but the student, almost unconscious of the transition, is flying before he knows it.

Here is an excellent action shot as Myhres, in the cockpit of the flying Cycloplane, pilots it over Woodson, who is in the ground training ship.

Experiments in Gliders

CHARLES A. BUSHNELL of Aberdeen, Wash., wrote us this month about two new gliders he has designed and expects to build this summer.

And to prove that he's an old timer in this glider business he sent us these

two photographs. The glider was built in 1921 by Charles and his brother Fred, who is now in the Air Service in Hawaii. They were 15 years old at the time.

"The glider was a modified Chanute biplane," Bushnell writes, "with single surface wings. It was flown very little, but made short hops and also lifted clear when running against strong winds. It was smashed before we had really tested it much—probably just as well as we knew little about flying at that time, in fact we had never seen a plane.

"I don't know just when the cat's flying machine was made, but probably six or eight years ago. It worked quite well, except that the cat wanted to stall it down. The apparatus had about

Even the cat had to learn how to glide.

a seven-foot wing spread and about two and one-half foot outrigger fuselage."

In speaking of his latest designs, Bushness describes them as follows:

"I am planning the construction of an extremely light, hang type motor glider, with full controls. This may sound nearly impossible but here are some of the specifications:

"Biplane, chord 4.5 feet, length 20 feet, Clark Y airfoil, single spar construction. No fuselage, small nacelle, outriggers and enpenage 16 feet long, 4 H. P. two cycle water cooled motor. Weight 75 pounds.

"Later I hope to construct a new type of soaring glider which will be built especially to establish new soaring rec-

(*Continued on page* 54)

Experiences of a Test Pilot

FOR seventeen years Captain Frank T. Courtney, called "the Airplane Doctor" by other pilots, has been testing new type airplanes.

He has flown literally hundreds of previously untried ships and he has cracked up more times than he can remember. But he doesn't forget the three times he came down in flames—once in the middle of the Atlantic ocean at midnight!

Wings have crumpled, rudders have come off, propellers have broken, and landing gear has collapsed—but Courtney has come through it all. He was shot down six times in one week on the western front—his ship out of commission or his observer wounded or killed; and he was wounded himself while trying to bring down an enemy kite balloon with hand grenades.

Naturally, one would think that a man who has lived through all these experiences would be a man "without nerves." Yet, according to Courtney himself, he is "just scared stiff" every time he takes up a plane and he is constantly thinking of the terrible things that might happen.

Courtney feels that it is this very fear of his while in an airplane that has been instrumental in saving his life on more than one occasion, for this fear has made him one of the most cautious pilots in the world. Further, when the thing he has been expecting actually does happen, he automatically does the one correct thing there is for him to do.

"There was that time, for instance," relates Courtney, "when a propeller on a two-motor job I was testing broke up. I'd been expecting it. Before I knew I'd done it, I'd cut the switch and put her into a bank."

That time in August, 1928, when he came down on fire in the Atlantic while attempting to fly from the Azores to Newfoundland, he drifted twenty hours before he was picked up. But this does not rank particularly high among his adventures in Captain Courtney's estimation. On the whole, that flight was a source of satisfaction to him because the precautionary measures he had taken in the event of such a forced descent worked out so well. But, as an adventure, he says it was topped off by at least two others that befell him.

Once, while he was trying a new barrel roll, the lower wing of his biplane broke in two and he couldn't do a thing with the ship—just had to let it come down its own way. It plunged downward in spirals and hit hard. The first 700 feet Courtney said he kept cussing himself and the last 300 feet he kept wondering whether or not he would get away with it. He did! He was merely scratched.

Courtney's toughest crack-up was when a wing broke up when he was only 120 feet from the ground! The ship immediately started to vibrate so much that he couldn't see a thing.

"It was only a matter of seconds, but it seemed like three years," he relates. "I kept thinking it was a nightmare and trying to wake up."

He was in a hospital two months after that wash-out! His first flight after he came out likewise resulted disastrously: the rudder came off the ship and he landed with the motor in his lap!

What a life for an "Airplane Doctor!"

Flying Club Shows Progress

The Barren Island flying club was started last June, 1930, at the Barren Island Airport by Adam G. Gorman, President of Gorman Aero Sales Co. of Brooklyn, N. Y.

At that time as had only 7 members. Now it has a total of 15 full paid mem-

bers, 5 of which have received their private licenses and 10 have soloed.

Victor Indrizzo, secretary of the club, reports that "things are running nicely. The ships we are using are the Barling 'N-B-3,' a low wing monoplane, and a new Barling 'N-B-4,' which will be used this Spring.

"Our club is operating on a non-profit basis, in accordance with the Nicholas-Beazley plan. We expect some new records to be shattered by our members this summer."

Fast Navy Plane

A NAVAL fighting plane recently completed is said by observers to have attained a speed of 300 miles an hour and an altitude of 29,000 feet. It was test flown by William Crosswell, who took it off the ground in less than 400 feet and after gaining altitude dived it at 350 miles an hour.

The ship is probably the smallest single-seated combat biplane ever made. It is powered by a new-type Wright air-cooled motor and is equipped with two machine-gun mounts. The fuselage is highly stream-lined and tapers to a V-shape at the bottom.

Great secrecy has attended the construction and testing of this plane, and no detailed information about it has been given out as yet by the Navy Department.

XUM

How to Build the Heath Parasol

Part V
The Fairing, Controls, and Landing Gear

Specially written for
POPULAR AVIATION
by

E. B. Heath.

YOUR airplane this month will actually start to look like a real plane, to say nothing of the fact that it actually is rapidly turning into a finished ship.

The construction work on the fuselage will be finished this month. The controls will be put in, the pilot seat installed, and tail skid made and put on. The turtle back and fairing work will be completed.

The interesting work of constructing and assembling the landing gear will also be included this month. The landing gear is of the split type and of the very latest design.

It is interesting to know that the new Lockheed planes being built for the Army have a very similar landing gear to the Heath parasol. Heath planes have used this split type strut and wire gear for some time.

The wheels which you will put on can do very much to affect the appearance of your entire plane. Wheels of a small diameter will greatly improve the appearance of your ship, and make it look much less like a home built plane.

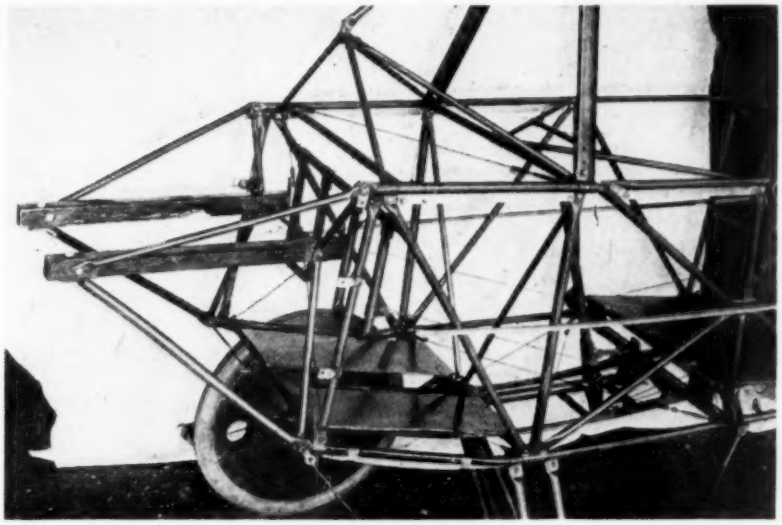
THE CONTROLS, FAIRING AND LANDING GEAR

By E. B. Heath

NO ADDITIONAL tools will be needed to complete this month's work. However the following materials will be required:

a. Stick Control:

V–450 18"x¾"x18 ga. (.049) steel tube (stick).
V–451 18"x⅞"x22 ga. (.028) steel tube (shaft).
V–452 1½"x13/16"x12 ga. (.109) steel tube (reinf.).



Closeup of the front of bolted fuselage showing pilot seat, control stick and pedals and attachment of landing gear.

V–453 ⅜"x5/16"x18 ga. (.049) steel tube (spacers).
V–454 1"x1⅛"x11 ga. (.120) steel tube (collars).
V–455 3½"x4½"x18 ga. (.049) sheet steel (control horn).
V–457 2 ⅞" aluminum bearings.
V–458 2 No. 8/32x½" R. H. M. S. and L. C. nuts (bearing).
V–459 2 No. 8/32x1" R. H. M. S. and L. C. nuts (bearing).
V–460 1 rubber grip.
V–461 1 threaded No. 5 taper pin and H. C. nut (hinge).
V–462 2 3/16" washers (side plate ends).
V–465 5"x½"x20 ga. (.035) steel strip (bridge).
V–466 ⅜"x½"x2½" fibre (bridge).
V–468 8 3/32" thimbles (elevator cables).
V–469 4 No. 324 S. F. turnbuckles.
V–470 48 ft. 3/32" cable strand (elevators).
V–471 1 1" shackle.
V–473 4 3/16"x½" N. S. bolts and L. C. nuts (V–469).
V–474 2 3/16"x1⅜" N. S. bolts and H. C. nuts (shackles).
V–475 6"x⅝"x20 ga. (.035) steel tube (reinf. V–450).
V–476 3"x10"x14 ga. (.083) sheet steel (side plates and bracket).
V–477 2 No. 4/36"x1" R. M. S. and nuts and washers (bridge).
V–478 3 No. 10/32x1¼" R. H. M. S. and H. C. nuts (stick and horn).
V–479 4"x2½"x18 ga. (.049) sheet steel.

b. Rudder Control:

V–504 36 ft. 3/32" cable strand (rudder).
V–505 4 pcs. 1/16" thimbles (rudder cables).
V–506 12 in. ⅝"x20 ga. (.035) sheet steel (cable lugs).
V–508 2 No. 324 S. M. turnbuckles.
V–515 18"x¾"x18 ga. (.049) sheet steel (fittings).
V–516 66"x⅝"x22 ga. (.028) steel tube (pedals and bar).
V–517 30"x9/16"x22 ga. (.028) steel tube (reinforcing).
V–518 10 No. 10/32x1" machine screws and H. C. nuts (pedals, bar and pedal stop).
V–519 2 3/16"x¾" N. S. bolts and L. C. nuts (for V–508).
V–520 18"x⅜"x22 ga. (.028) steel tube (pedal stop).
V–521 2 3/16" H. C. nuts (for item V–518).

c. Pilot Seat, Heel Rests, and Tail Skid:

V–535 16"x26"x¼" plywood (pilot seat and heel rests).

A lineup of Heath Parasols. The baby Austin has squeezed its way into the picture but doesn't somehow interfere much with our view.

V–536 66"x½"x½" spruce (reinforcing).
V–537 18 No. 8/32"x1" machine screws and nuts.
V–538 42"x⅝"x20 ga. (.035) steel strip (for V–535).
V–539 12"x21"x¼" plywood (seat back).

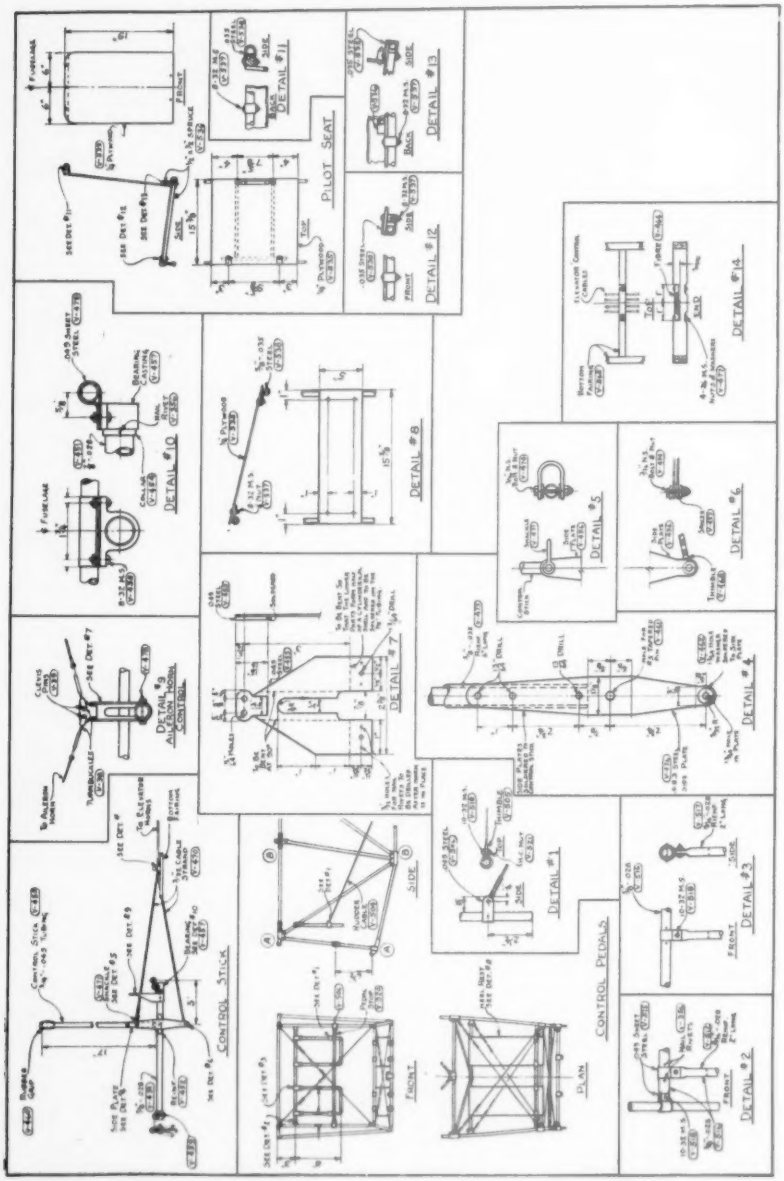
d. Tail Skid:

V–545 38"x1"x⅛" spring steel.
V–547 1 ¼"x1½" N. S. bolt and H. C. nut.
V–548 1 No. 8/32x1½" machine screw and nut.
V–549 3"x⅜"x22 ga. (.028) strip steel (clip).
V–550 1 ⅛" rivet.
V–551 1"x9/32"x22 ga. (.028) steel tube (spacer).
V–552 1"x4"x16 ga. (.065) steel strip (clamp).

e. Material for Fairing:

V–560 26"x16"x⅛" plywood (bulkheads).
V–561 4 pcs. ¾"x¼"x60" spruce (fairing).
V–562 2 pcs. ¾"x¼"x80" spruce (fairing).
V–563 1 pc. ¾"x¼"x92" spruce (fairing).
V–564 2 pcs. ½"x⅜"x11' 4" spruce (side fairing).
V–565 4 pcs. ⅝"x⅜"x60" spruce (bottom fairing).
V–566 6"x⅝"x⅝" spruce (rear former).
V–567 18 No. 6/32 R. H. M. S. and nuts 1" long.
V–568 36"x½"x22 ga. (.028) strip steel (clamps).
V–569 ¼ lb. aircraft glue.
V–337 14 ft. ⅝"x⅝" spruce strip (upholstery).
V–358 24 R. H. M. S. 4/32"x1" nuts and washers (upholstery).

The control stick and pedals, and the control details.



f. Landing Gear:

V–620 6 ft. 1"x10 gauge (.134) steel tube (axles).
V–621 2 axle caps (drilled).
V–622 2 5/32"x2" cotter pins (axles).
V–623 4 in. ⅜"x18 gauge (.049) steel tube (spacer).
V–624 2 bronze axle spools 1" bore.
V–625 2 wheels 20"x2", or 18"x3" wheels or 16"x4" wheels.
V–626 2½ yards fabric (for covering wheels).
V–627 2 ft. 3/16" round rod (safety clips).
V–628 9 ft. ⅛" cable strand (brace wires).
V–629 6 ft. shock absorber cord.
V–630 8 ⅛" thimbles.
V–631 4 No. 326 turnbuckles (brace wires).
V–632 4 3/16" clevis pins.
V–633 8 in. ½"x14 gauge (.083) steel strip (wire pulls).
V–634 3 in. ⅛" rod (rivets).
V–636 6 in. 7/16"x14 gauge (.083) steel tube (perches).
V–637 3 ft. 2 in. ¾"x18 gauge (.049) steel tube (front struts).
V–638 4 ft. 6 in. ⅝"x18 gauge (.049) steel tube (rear struts).
V–639 8 ft. 6 in. 9/16"x22 gauge (.028) steel tube (spreaders).
V–640 3 ft. ½"x18 gauge (.049) steel tube (reinforcing).
V–644 2 N. S. bolts ¼"x2" and H. C. nuts.
V–645 2 N. S. bolts ¼"x4½" and H. C. nuts.
V–647 4 No. 10/32 machine screws and nuts.
V–648 14"x3"x16 gauge (.065) sheet steel.
V–649 4"x1½"x14 ga. (.083) sheet steel.
V–650 6"x½" rubber hose.

Procedure:

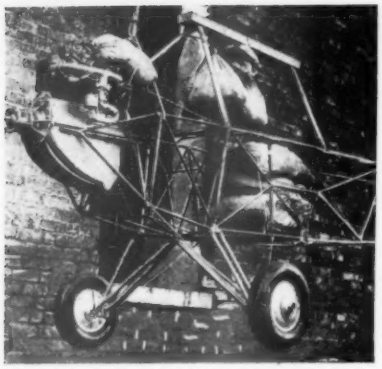
THE stick control cannot be installed in the fuselage until the landing gear is attached, for the front bearing is bolted to a bracket fastened to the fittings for the axle ends. (See control stick drawing). It can, however, be made.

Saw the torque shaft (V-451) to a length of 16¼". Insert the reinforcing tube (V-452) into the shaft until its rear end is 4¼" from one end (rear) of the shaft. Drill a 17/64" hole for the hinge pin directly through this reinforcing and the shaft, 5" from its rear end.

Rivet (V-356) (see April issue POPULAR AVIATION) a ¼" wide collar (V-454) at the rear of the shaft, centered 1⅛" from the end of the shaft. Use a ⅛" drill for the rivet hole. For the horn cut a flat shape from V-455 like that shown in detail No. 7 and reinforce the top end by soldering another thickness of V-455 to it. Bend both sides in the same direction and curve the lower ends of the sides to clasp the shaft. "Tin" the inside of the curved ends.

Solder and rivet (V-356) this horn to the shaft with its stiffening edges toward the front at right angles to the hinge hole so that it will be in line with the control stick. The horn is placed next to the rear collar. Drill a 13/64" hole through the horn and the shaft and bolt (V-478) together.

Reinforce the control stick (V-450) for 6" at its lower end with V-475. Drill a 13/64" hole in the reinforced section 2⅛" from the end. Saw two side plates (V-476) and drill five holes



This view shows a Parasol fuselage loaded with 450 lbs. of sand ready for the 24 inch landing gear drop test.

in each according to your print (Detail No. 4). Solder a washer (V-462) over the hole at the lower end of each plate.

At a point 5/8" above the largest hole or hinge hole, in each side plate put a 1/8" offset. This is done so that the plates will lie closely against the sides of the control stick. The plates are held to the control stick with solder and three bolts. "Tin" the stick and the plates. Bolt (V-474) through the holes previously drilled in the stick, solder in place and drill the other two holes in the stick. Bolt (V-478) in place.

Mount the control stick on the torque shaft with a taper pin (V-461) reaming one end of the hole for a close fit. Bolt (V-474) the large shackle (V-471) at the stick end of the side plates (Detail No. 5) and bolt (V-472) the two lower ends of the side plates together (Detail No. 6) with a 7/16" long spacer (V-453). Put on the rubber grip (V-460) and mark and store the bearings (V-457), cables (V-470), turnbuckles (V-469), bolts (V-458, 459, and 473), thimbles (V-468) and bracket material (V-476 and V-479).

The Guide Bridge:

ROUT out the center of the 3/8" side of the fibre block for a depth of 1/4" and a length of 1 1/2". From V-465 make two clamp fittings and with them attach (V-466) the fibre block to the lower side of the bottom cross strut (D) at its center with the cut out edge open and away from the strut. A cross piece of the bottom fairing will surround this bridge and form an enclosed slot in whch the elevator cables will run.

The Rudder Pedals:

FOR a hanger bar cut a 17 1/8" length from V-516, reinforce at each end for 2" with V-517. Heat and flatten the ends for 3/4" in the same plane. Attach to the second side truss members with clamps (V-515) centered 3" below the center line of the top longeron. For a pedal cut a 19" length from V-516 and reinforce at its center (toe bar) with a 7 1/2" length of V-517.

Mark points 2" each way from the center of the tube, heat and bend both ends of the tube with the marks on the insides of the bends to a U shape. Reinforce (V-517) both ends for 2", heat and flatten in the same plane as the toe bar of the pedal.

Make strap bearings (V-515) and bolt (V-518) the pedals to the hanger bar. The pedals should swing easily. Hold the pedals at their locations with rivets (V-356), driven through the hanger bar at the outside edges of the pedal fittings. (Details No. 2 and No. 3). Make a cable clamp fitting (V-506) for each pedal (Detail No. 1). Rivet and solder these to the outside legs centered at points 6" from the center of the hanger bar. Drill a 13/64" hole in each lug for a No. 10-32 machine screw (V-518).

Leave room between the machine screw and the pedal leg for the thimble and loop of the rudder cable. Make a pedal stop (V-520) and clamp (V-537 and V-506) to the first side struts 7" above the center line of the lower longerons. This, when cables of the proper length are installed, will prevent the rudder and elevators from interfering with one another. Tag and store the cables, thimbles, turnbuckles, and bolts until later.

Pilot Seat and Heel Slides:

FOR a seat, saw a piece of plywood (V-535), 15 1/2"x16". To this nail and glue (V-569) the reinforcing pieces (V-536) as shown in your print. Make clamp fittings (V-538) and bolt (V-537) the seat to the top of the fourth bottom cross strut and to the upper tie rod.

Make two heel slides (V-535), 15 1/2" x5" and bolt (V-537) with clamps (V-538) to the first and second bottom cross struts. (See print). Reinforce the seat back (V-539) where it touches the top cross strut and nail and glue a cleat to the seat top to which the back will be screwed.

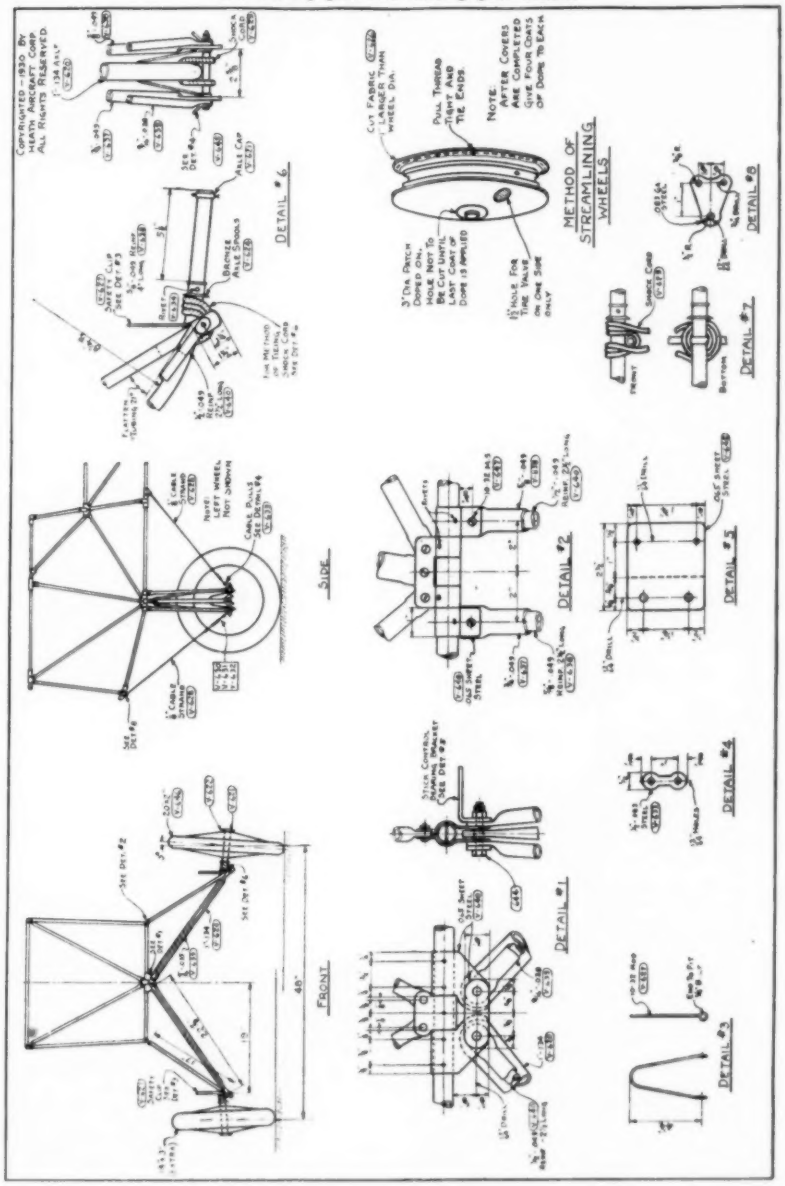
The Tail Skid:

HEAT the strips of spring steel (V-545) to a bright red and hammer the leaves to the shape shown in Detail No. 1, fuselage print. Drill a 17/64" hole centered 1/2" from the stub end. Drill a 9/64" hole in the second leaf for a rivet.

Spring steel should be drilled using

(*Continued on page* 50)

The landing gear and landing gear details.



Reader Has Exciting Flying Experience

By **B. S. BROKAW**

THIS is in answer to your general invitation to write in and tell about "that interesting flying experience you had last summer." I had several of them and I just feel in the mood right now to talk about them.

As a background I might mention that I am an L. C. pilot—a graduate of Roosevelt Flying School and, by way of mention, my instructor was that altogether likable chap, "Husky" Flewellen, whom I notice your "Junior Activities" editor, Paul W. Clough, also thinks is quite "the nuts."

I had just fifty hours and five minutes when I went up for my L. C. exam.

"This will give you a good idea of what a swell looking egg the writer is."

and it still makes my head swell to recall the inspector's comment when we came down after my demonstration of steep and shallow "eights," stalls, 720° verticals, etc.

"That was damned fine flying," was the praise I earned and that from such a source sure made me feel great.

No, I didn't crack up next time out—that would be following the fiction stories too closely.

I had no more than gotten my license when I went to work for a fellow up in Copake, New York, a little country town in the Berkshires which of late years has come to be quite a summer resort.

He had a private license and had invested in a field, a hangar and a Kitty Hawk powered with a Kinner and he wanted to get a little back on his investment—and I wanted to get in some time—so we got together on it.

One Sunday in August I was giving a friend of mine a few lessons in the fine art of landing without bouncing. We had been at it about half an hour I guess and were just taking off for a final attempt when, about 100 feet in the air, the plug blew out of the top cylinder.

No matter how you look at it, motor failure on the take-off is "just too bad," to use a favorite phrase of Husky's. But here's what we were up against—

(*Continued on page* 64)

Parks van Tassel—Pioneer Parachute Jumper

WITH the death a short while ago of Captain Parks van Tassel of Oakland, California, at the age of 78, there passed on one of the first successful parachute jumpers and one of the greatest balloonists of his time.

Van Tassel's first experience with a balloon was in the days when he was a barefoot boy on a farm in Ohio. He had seen a balloon ascension at a fair and, together with neighbor boys, resolved to have a balloon of his own. This they constructed of paper according to what they had seen of the big balloon. It proved to be a novel toy.

Captain van Tassel built his first parachute from a picture in a dictionary. Parachutes had been known for many years prior to the 1870's, and men had made descents in them in France, but these were so frequently fatal that the parachutes were known as "man-killers."

Balloonists of those days restrained themselves with dropping at most a live pig. But van Tassel figured that if a live animal could descend why not a live man. Whereupon he built a parachute and began to thrill spectators with parachute jumps from a balloon.

One of his first ascents as a balloonist was made at Albuquerque, New Mexico, in 1879. The town was just beginning and the gas plant from which he filled his balloon was so weak it required two days to fill the balloon, during which time the customers went without gas heat or light. But they were willing, as it was the first ascension they had seen.

In 1889, he had one of the closest calls of his career in a jump near the Cliff House in San Francisco. He leaped from the balloon and part of the parachute opened; but his legs were entangled and, according to a news clipping of the day, "the spectators were horrified to see him falling to apparent certain death." But he kicked loose, the parachute opened fully and he landed at the edge of the tide, while the crowd cheered.

Captain van Tassel made balloon flights all over the world, meeting with numerous adventures wherever he went. Once, in Siam, he alighted in a mulberry tree. On another occasion he was threatened by religious fanatics in India who feared he would cause trouble for them as a result of his contacts with devils of the upper air.

At Salt Lake City, Utah, in 1883, he made his longest flight, at which time he was in the air six hours and forty-five minutes and traveled about 300 miles.

One of the first women to make a parachute jump was Captain van Tassel's wife, who jumped from a balloon at Los Angeles on July 4, 1882. The idea of a woman doing such a thing threw the town in an uproar. Many, including the chief of police, maintained that no woman was going to be allowed to commit suicide on a national holiday. However, the Mayor and a number of other influential persons were on the Captain's side, so his wife went up with him and each of them made a successful parachute jump from the balloon.

Amateur Makes First Solo in Home Built Plane

THESE photographs show the Church Mid-Wing that T. L. Kidd of San Antonio, Texas, recently completed.

The partially finished view shows clearly just where the wing was mounted, how the loading gear was attached, and also how the motor was mounted.

The view of the finished plane shows what an excellent product Kidd had to boast of when he had completed his ship.

The builder of the ship had taken some dual instruction before building his own plane, but he had never soloed. On completing his plane, he took it up for the first time, thus soloing himself, and at the same time giving the plane its test flight.

Everything came out fine for both the pilot and the airplane on this first flight. Kidd built his plane from the Church Mid-Wing plans and construction set.

The partly finished plane above finally became the trim appearing and snappy flying job shown at the left.

Practical Lessons in Flying

by JOHN B. RATHBUN

THE SOLO

AT last the time had arrived—the day of days that Bob had been so eagerly anticipating during his student days! In short, Bob was to solo for the first time and to jump her off the grass without any sage advice from the front cockpit.

Before giving him permission for this epochal adventure, Ed Keith had several other instructors check up on Bob's performance according to the rules of the school, and since the word "O. K." had been unanimous, the order had been given for this first solo.

Bob was elated and self-confident. Ed, the instructor, was far more nervous than his student, although he tried to hide his inner sensations under a brusque business-like manner.

"Well, old kid, you are going to do your stuff all by your lonely this time," spoke Ed with a cheery grin. "And believe me, you are going to take the full ticket to the end of the line.

"I'm going to sit here in this old chair from now on, and it's up to you to do the whole thing from swinging the prop to locking the barn door. So while you're just hanging around, you might start by going over and get her warmed up."

Obedient to orders, Bob marched over to the ship, put the chocks under the wheels, turned on the gascock and inspected all parts included under the usual code for the preliminary inspection.

He looked into the cockpit, making sure that the ignition was on the "off" position, and that the throttle was open to the proper notch. His vigilant eyes missed nothing, from the filling of the radiator to the action and feel of the controls. He knew that a single false move or omission in this routine would not escape the attention of the pilot, and that such an omission might ground him for some time.

O. K. He swung the prop around the two full revolutions, switched on the ignition, and then jammed her prop back against compression. Only two snorts, a couple of bluish puffs of smoke, and she lapsed into her peaceful attitude once more.

Bob then swung the prop around the circle twice more, and then came the quick, snappy throw that sent the "OX" roaring. Another visit to the cockpit to throttle her down to the proper idling speed for warming up, and then he walked back to Ed's observation post in the lee of the hangar.

"WHAT next, chief? Give the low down on what's to happen next," smiled Bob at his instructor. "Here I am all dressed up and rarin' to go. Just as soon as I get that old boiler warmed up, I'm off and I don't mean maybe. And then — whoopee — just watch me."

"Yeah?" replied Ed, "well, I guess everything's all right but that whoopee stuff—you can just as well cut out that part of it and celebrate the victory some time next year. And just let me tell you, young fellow, that if I didn't know you as well as I do for being a cool, level-headed bird I'd ground you so hard for that 'whoopee' crack that your pants would smoke. Self-confidence is a swell thing, but don't forget that reliance and recklessness are two different things.

"And I'll tell you another thing. No matter what your opinion of me may be at the present, there'll be a time coming this morning when that front cockpit is going to look awful empty and you'll be craving for your old pal."

Ed was smiling when he said this, but Bob knew that he was in dead earnest.

"And another thing," added Ed, "I weigh about 170 pounds, and when that weight is missing you'll find that she handles a little differently. She'll climb faster and will scoot along further on landing.

"We used to have a rule in this joint that the gang must put in a sand-bag weighing about as much as the instructor for the first solo so that this change wouldn't introduce any new problems for the student at this time, but we finally gave it up to avoid spoon-feeding the student too much.

"Be a lot more careful about your take-offs and landings this time, because you are landing a light ship for the first time. If you crack up this sweet crate, I'll take you over my knee and spank you.

"Now, I'll give you the line of march for the big parade, and don't you try to throw any of your own ideas into it, either. Of course, the first thing to do is to take-off; you can't very well fly without doing that. Next climb up to about 1,000 feet and circle around the field six times to the right. When you accomplish this tremendous undertaking, make your landing right over there in the old groove. I'll be waiting for the pieces.

"All right, all right, let's get to rollin'; she's revving nice and smooth now, and I guess that she's hot enough to pull you out of almost anything"

Ed climbed reluctantly out of his chair for the big trial, a performance that was much more of a trial to him than to the eager student. Was the kid going to make the grade with honors, as he believed that he would, or was there to be a dismal failure, with more ground work and with hot-headed criticism from the big office?

No, he believed in Bob, his caution and his ability to reason things out even in the face of a crash. So be it.

BOB climbed into the rear cockpit, blipped the engine a couple of times to clear her throat and waited impatiently as he fastened his safety belt. Everything O. K. up to date.

Then came the instructor's voice in a pleading tone. "Bob, for the love of Mike do a good job for my sake, if you don't care for your own. I've been boosting your stock so long around here that I'll get the razzberry good and proper if you make one of those boom-boom landings that the rest of this feather-head gang have been making around here. Show 'em how to do it so papa will be as proud of you as he always has been."

Ed waved his hand, over went the throttle and up came the prop with a roar. Down the old familiar lane he started, but long before he got to the bunch of rag weed that marked the end of the trail he was off.

He set her at about the stick position as before, throttle at the same position as usual, and then sat there in a fool's paradise in full enjoyment of his first solo.

He wasn't nervous—not a bit—for this flying business was getting to be an old story now, and he avoided thinking of the empty cockpit in front of him. He had had ten hours up to date, and every movement of the stick had become automatic and impressed upon

"What next, chief?" smiled Bob at his instructor. "Here I am all dressed up and rarin' to go."

his subconscious mind until controlling the ship became as natural as riding a bicycle.

However, the quick take-off and the light, buoyant feel of the ship should have warned him that the light ship was gaining altitude far faster than usual, but in his excitement he had forgotten all about this phase of the matter even though Ed had warned him about it just before he took off.

Just at this point the corner of his eye caught a glimpse of the earth below him. Great Scott! He took a quick glance about that fully electrified him, for there was not a thing that he recognized and, to make matters worse, everything was partially obscured by a thin haze that enveloped the ship!

The field with its four familiar hangars was nowhere to be seen and the only distinguishable thing that came to his startled gaze was a mass of thin, stringlike country roads that were totally unfamiliar to him. He had been asleep at the switch a little too long this time, a fact that the altimeter checked up by indicating 7,500 feet!

"Serves me right if Ed gives me a good bawling out for this," thought Bob. "If I'm lost, and it looks like it, then there'll be heck to pay if I ever get back. About the only thing in line now is to get down on the 1,000 foot level and take a good look around. Maybe I can get straightened out then."

He pointed her nose down until the altimeter showed 1,000 feet, and then began to scout around for some familiar landmark. Still none. Bob had heard of men being lost this way before but, being beyond his experience, had not paid much attention.

Round and round he flew, getting more bewildered and alarmed at every turn, until finally he saw an old friend way over on the horizon—the old factory smokestack that Ed had warned him about so many times. Around he came—pronto—never did anything look so welcome as the dingy brick spire and the trail of soot black smoke trailing out of the top.

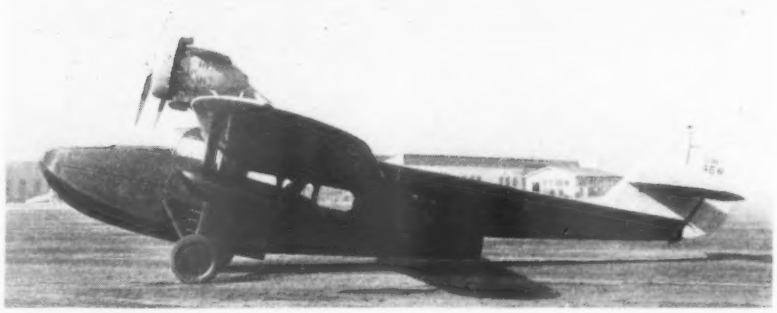
Once over the stack, he quickly picked up the field and decided to follow out Ed's instructions on the subject of circling the field. Once around, twice around and finally the six circles were performed, the last two being nice tight ones with the ship banked up at about thirty degrees. And now for that landing.

DOWN he sailed along a nice normal gliding path toward the landing streak on the field, but now he was more conscious than ever that the ship was light. This was far more apparent with the engine throttled down, for she seemed to take on new life and glide by herself. The net result was that he overshot his objective by a good 500 feet.

In the attempt to sit her down at any price he whammed old mother earth with one wheel so hard that it made the little ship grunt and bounce about three feet. However, he kept cool and gave her the gun good and

(*Continued on page* 58)

The Douglas "Dolphin" High Speed Amphibion



THE "Dolphin" is a twin-engined, high wing monoplane amphibian developed by the Douglas Aircraft Company for commercial use in response to the demand for a high speed 6-8 place dependable machine of this type.

Powered with two Wright J-6, 300 h. p. engines, the plane has the following performance:

Span	60 ft.
Length	42 ft. 6 in.
Height	14 ft. 7 in.
Weight, empty	5,400 lbs.
Useful load	2,400 lbs.
Gross weight	7,800 lbs.
Fuel capacity (180 gals.)	1,080 lbs.
Oil capacity (18 gals.)	135 lbs.
Crew (1) and passenger (7)	1,440 lbs.
High speed—sea level	136 m. p. h.
Landing speed—sea level	60 m. p. h.
Rate of climb	700 ft./min.
Cruising speed	108 m. p. h.
Service ceiling	14,000 ft.

The hull is divided into six compartments separated by five water-tight bulkheads. These compartments are made so that they are all very accessible for ease of maintenance. Access to the bottom and keel is gained by lifting a center board which comes out in sections throughout the entire length of the hull.

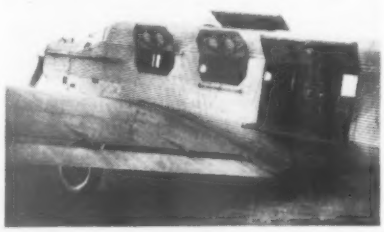
The front windows of the cockpit can be opened for six inches for direct visibility ahead without the pilot getting any wind on his face. This is exceptionally valuable in thick weather.

The brakes operate by a slight pressure of the toe. The rudder is effective and of sufficient area so that in flying with one engine there is enough rudder action to turn into the engine which is doing the pulling without having to bank the plane to do so. This makes the plane maneuverable on one engine.

Planes Designed to Carry Freight

THERE is a constantly growing demand throughout Continental Europe for swifter transportation of freight.

To meet this demand the Junkers Works have just brought out a mammoth new plane specially designed for long-distance flight. This is known as the "JU-52" and is a monoplane powered with a single 700 h. p. engine.



The Junkers monoplane specially built to haul freight over long distances.

The plane has a wing spread of 80 feet and can carry a pay load of three tons.

This view gives a good idea of the spacious compartment provided in the new plane for the handling of bulky freight.

Gas Mixture to Aid Altitude Flyer

ABSTRACTION of carbon dioxide and the rare gases from ordinary air makes it unfit to breathe. Yet a mixture of helium and oxygen seems to be just as good for the purpose as ordinary air and likewise a mixture of argon and oxygen.

The helium-oxygen atmosphere is now being used by divers and caisson workers. It is much safer for them than ordinary air, because the nitrogen of the latter has a tendency to form bubbles in the blood, giving rise to the often fatal malady called the "bends."

It is believed that flyers seeking high altitudes may soon carry this or some other prepared artificial air aloft with them instead of the compressed oxygen now being used.

Prize Offered for Glider Flight

A PRIZE of 1,000 crowns ($268) will be awarded by a Danish newspaper for the first glider flight across the sound between Denmark and Sweden.

The competition is international and is open to all who can submit evidence of a previous flight of at least fifteen minutes' duration. All entry applications must be accompanied by a short description of the glider.

Merchants Give Free Airplane Rides

MERCHANTS in the towns of Rockland, Camden and Rockport, Me., co-operated with the Curtiss Flying Service to give free airplane rides to cash patrons of the stores concerned in the plan.

The merchants gave to every cash customer a ticket representing a certain number of pounds, based on the dollar unit. When the customer had accumulated enough tickets to cover the owner's weight, he presented the tickets at the Curtiss base and received a free airplane trip.

To secure full benefit of the plan, ticket holders must present tickets to the full amount of their weight. Half tickets and half cash were not accepted. The Curtiss people donated trips to the total of 52,500 pounds through the months of November and December.

Planes Used to Hunt Seals

AIRPLANES are now being used to hunt seals. A fleet of planes will fly over sealing grounds in search of the best schools of seals, which are easily distinguished from the air.

When the pilot has discovered the quarry, he reports the position, by wireless, to the sealing ship.

Chinese Youth Wins Flying Scholarship

VINCENTE PON, a native of Cantong, China, who is enrolled as a Limited Commercial Pilot at Parks Air College, competing with students from every state in the Union and representatives from more than 14 foreign countries, was recently declared winner of the school's scholarship competi-

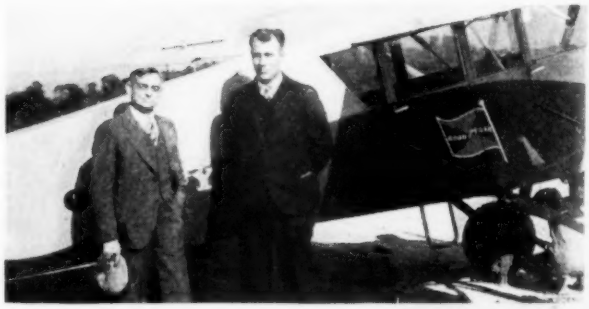
George Gruen, Chief Pilot, presents Parks' Scholarship to Vincente Pon.

tion. He was presented with $2,735.00 worth of flying time as first prize.

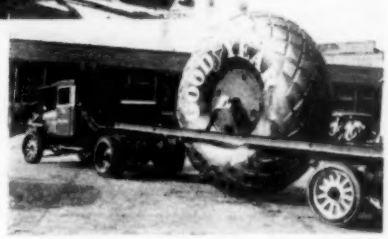
Young Pon, who was born in Cantong, China, came to the United States on December 26th from Tela, Honduras, C. A. He is 26 years of age and a watchmaker by trade. He is the son of Pon Ho See of Cantong and is a graduate of the Commercial School of the same town.

The other winners in the competition were: Arthur E. Shaddinger of Pipersville, Pa.; Thomas Zeigler of Toledo, Ohio; Gordon Walsh of Ware, Mass., and Elmo Davis of Berwick, Iowa.

A. J. Musselman, Inventor of Airwheels



A. J. Musselman at left, with Bill Hudson, the pilot who made a record of 498 landings in one day to test the Musselman internal hub brake. Below, a 12 foot airwheel on display for advertising purposes.



MR. A. J. MUSSELMAN, who invented one of the outstanding improvements on an airplane in recent years, had never flown an airplne, and never even rode in one until a good many months after he had invented his famous full-balloon tire (Airwheels) for airplanes.

Musselman, who built one of the first cord tires ever made, realized about 1917 that the airplane needed a tire of its own, constructed to accomplish a very new and different job from any other tire then known. He set about to build such a tire.

His first attempts were decided failures, and when several experts had advised him that the ideal or full-balloon tire was a structural impossibility, he gave the job up until about 1927 when he began experimenting again with the full-balloon idea.

In 1928 he succeeded finally in building a tire which used the hub for a foundation—in short a tire which was a wheel in itself.

But Musselman was not a flyer. He didn't even know a pilot who could try out his invention for him. He had never even been close enough to an airplane to take a good look at one. However, he felt confident that his new tire-wheel would make airplane landing much safer and would allow planes to taxi over sand and mud, but he had no way to prove it.

Finally, to test his theories he built a bicycle with a special frame to take those big, fat do-nut tires. Just as he had anticipated this strange looking bicycle could be ridden in deep sand and mud, over curb stones and railroad ties without effort. That was how the tire was first tested.

It was over a year later that "Shorty" Fulton, manager of the Akron Municipal Airport, actually tried out the tires on an airplane.

"Shorty" took off with some misgivings on a field covered with ice and snow. The big, fat do-nuts were inflated to only ten pounds and they didn't look any too substantial compared with the old high pressure tires.

But on the first landing "Shorty" peeked over the edge of the cockpit with a broad grin on his face.

"Just like falling into a feather bed," he announced, and forthwith gave 'er the gun for another take-off and landing.

In about half an hour the veteran pilot had discovered that he could bring his ship down at any angle without a jolt, and that try as he would he couldn't make the plane ground loop. "Shorty" climbed out of the plane declaring that the new tires were the greatest thing he had ever ridden.

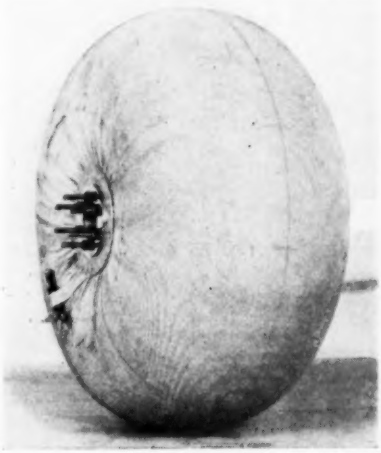
Numerous pilots already owe their lives to the tires. Mr. Musselman receives reports almost daily of flyers who have either avoided the hospital or a costly crack-up during forced landings.

One flyer in Michigan reported recently that he made a forced landing on the edge of a lake which was frozen over with an inch or two of ice. He headed straight for shore as he hit the ice. There was an awful crash as the ice gave way, but the tires held the plane on the surface all the way to the shore.

When the pilot was finally on land he looked back and found that he had

(*Continued on page* 51)

One of the first tires made by Musselman. It is hand-made, unvulcanized.



MODEL DEPARTMENT

How to Build the Fokker Triplane

by

JOSEPH S. OTT

An actual photo of the Fokker Triplane, a German fighting ship made famous by Baron von Richtofen.

THIS month we have a very unusual model of a world famous German fighting plane. This plane was recommended by the German ace, Baron Manfred von Richthofen, who is better identified as the leader of Richthofen's Circus or "The Red Knight of Germany."

Along with the construction of this model one can appreciate the history and traditions attached to it by reading that very interesting book by Floyd Gibbons entitled, "The Red Knight of Germany." This book is well worth a trip to your public library.

The Fokker F. I. No. 102-17 model is a very sensitive, fast flying little ship. It can develop plenty of climbing ability due to its triplane wings and can be flown R. O. G. (Rise Off the Ground) or H. L. (Hand Launched).

The motor stick is removable from the body for winding purposes. The power plant consists of a 10-inch propeller driven by eight strands of 3/32x1/8 inch model airplane rubber, slung to a conventional motor stick 14½ inches long. Its wings measure 30 inches from tip to tip.

The design is entirely new to the model flying fields in this country although the original ship when flown by "The Jolly Baron" during the world war was the immediate cause for developing most of the efficient fighting ships used by our fliers against the Germans.

We feel that in offering this plane in model form we are presenting a design that will prove interesting as well as instructive. We know that when you appear on your local model flying field with this triplane fighter you will be the center of interest to all.

If properly built the little ship will perform for you with the same gratifying results that made the famous German ace write to his government praising the superior flying qualities of its design over the allied planes of that time.

Ott's authentic reproduction of the original Fokker Triplane. This model is shown only partly covered to give the model builder a skeleton view of the construction.

Materials Required.

No. 1. Body—10 pcs.—3/32"x3/32"x30"—Balsa.
No. 2. Tail—2 pcs. — 1/16"x1/4"x15" — Bamboo.
No. 3. Landing Gear—2 pcs.—1/16"x1/4"x15"—Bamboo.
No. 4. Struts—2 pcs.—1/16"x1/4"x15"—Bamboo.
No. 5. Wheels—2-2" diam. Celluloid.
No. 6. Propeller—3/4"x1"x10"—Balsa.
No. 7. Fittings—1 set Metal Fittings.
No. 8. Rubber Motor—10 ft.—1/8" 30 gauge.
No. 9. Motor Stick—1 pc.—3/16"x1/4"x15"—Balsa.
No. 10. Spars—3 pcs.—1/8"x1/8"x30"—Balsa.
No. 11. Entering Edge—3 pcs.—1/16"x1/8"x30"—Balsa.
No. 12. Trailing Edge—3 pcs.—1/16"x1/4"x30"—Balsa.
No. 13. Rib Stock—2 pcs.—1/16"x2"x30"—Balsa.
No. 14. Tissue—3 sheets — 18"x24"—Super Fine.
No. 15. Cement—Small can.
No. 16. Dope—Black and Red.
No. 17. Lacquer—Black and Red.
No. 18. Banana Liquid—Small can.
No. 19. German Crosses.

Wings

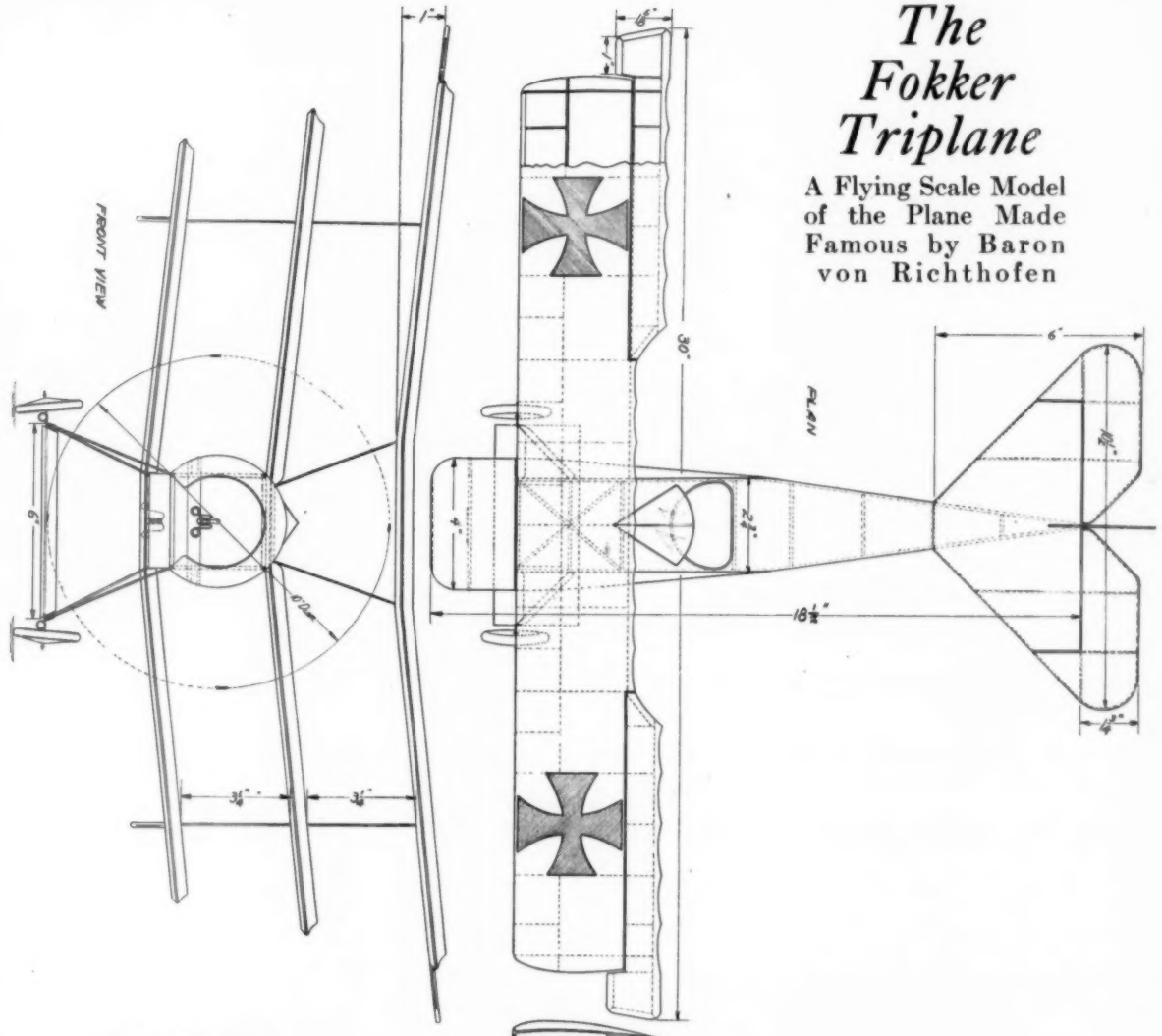
Three wings are required. They are mounted with their leading edges in echelon. Triplane wings are named according to their position on the ship, namely: upper wing, intermediate wing, and lower wing. In this model the lower wing is adjustable.

Ten full ribs must be prepared for each wing. Short nose ribs extending from leading edge to the spar are inserted between the full ribs to preserve rigidity of airfoil.

The wings are all of the single spar type. The spars are cut from 1/8"x1/4" balsa wood steamed so that their tips provide a 1" dihedral above the centers.

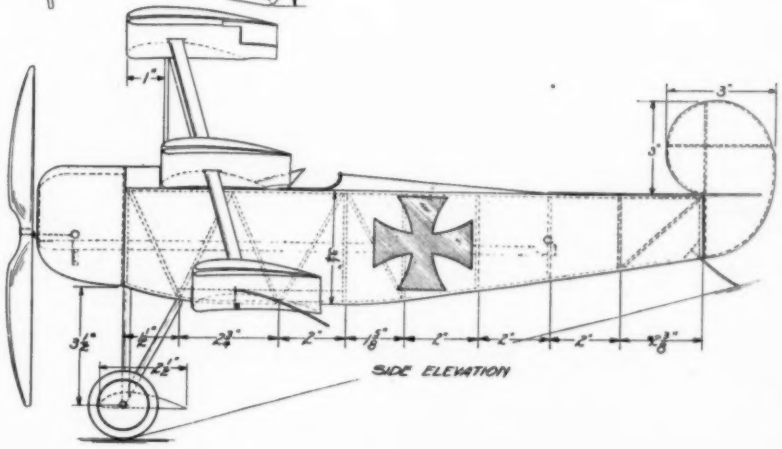
The Fokker Triplane

A Flying Scale Model of the Plane Made Famous by Baron von Richthofen



Color Scheme

Body	*Deep rich red*
Tail	*Checkered*
Nose	*Aluminum*
Prop	*Mahogany*
Wings	*All white*
Ailerons	*Red*
Landing gear	*Black lacquer*
Wheels	*Black*
Struts	*Black lacquer*



If steaming the spars is not desired they may be broken at the centers and cemented so that they will dry in shape to provide the necessary 1" dihedral at the wing tips.

The upper wing has a larger cord than the two lower wings due to the aileron effect incorporated in its airfoil.

The leading edges of the three wings can be made of $\frac{1}{8}$" square balsa strips or, if more strength is desired, in spite of a little added weight, the leading edges can be made of $\frac{1}{8}$" bamboo.

The trailing edges of the wings can be formed by running linen thread along the trailing rib tips and securing it with cement, or use $\frac{1}{16}$"x$\frac{1}{4}$" balsa strip and cut scallop out. This will give the scalloped effect commonly found on the trailing edges of the German fighting ships.

Two wing struts are formed of $\frac{3}{8}$"x$\frac{1}{16}$" balsa. These struts should be streamlined by careful sanding. Four struts are formed to support the upper wing and the intermediate wing centers where the intermediate wing rests against the body. They can be made of either split bamboo or balsa $\frac{1}{16}$"x$\frac{1}{8}$" sanded to streamline shape.

All struts have their attachment to the wing spars and are securely cemented to hold the wings firmly.

Body

The body is formed by bulkhead and longeron construction fitted with a N. A. C. A. (National Advisory Committee for Aeronautics) cowling. Seven bulkheads are required. They are cut out from $\frac{1}{16}$" balsa stock. The longerons are $\frac{3}{32}$" square and fit into notches cut

Left, full-size rib pattern for the intermediate and lower wings. Right, full-size rib pattern for the top wing.

in the bulkheads. The front bulkhead can be fitted into the N. A. C. A. cowling and cemented.

It is possible to buy aluminum N. A. C. A. cowlings for a few cents at any of the model supply stores. These cowlings are furnished in different sizes and one of four inches diameter should be secured for this model.

A cross beam of $\frac{1}{8}$"x$\frac{3}{8}$" balsa is mounted in position 1" back from the nose of the N. A. C. A. cowling. This balsa cross beam holds the metal wire motor stick clip. It is secured with a liberal amount of cement and held by two pins pushed through holes drilled in the cowling on either side.

The N. A. C. A. cowling is cut out at the center of the nose to admit the insertion of the motor stick. A neat job can be done by drilling and then finishing with a fine metal file.

The windshield is made of .010 transparent cellophane or a clean piece of discarded kodak film. The shape of the windshield is preserved by $\frac{1}{8}$" square balsa strips cemented in position as shown in the drawing.

Two wing skids are provided to protect the lower wing surface in case of an uneven landing. They are formed of split bamboo $\frac{3}{32}$"x$\frac{1}{16}$" cemented to the under side of the lower wing spars. The best position for these wing skids is directly under the wing struts where they can transmit the shock to the whole model frame with small chance of wing breakage.

The tail skid is made of split bamboo $\frac{1}{16}$"x$\frac{1}{32}$" which has been bent to conform to the conventional shape. It is cemented to the triangular brace at the bottom of the stern post of the fuselage. In placing the tail skid far back on the fuselage better protection is provided for the rudder frame in case of a tail low landing during adjustment flights of the model.

Landing Gear

Two-inch diameter wheels are required for the landing gear. They may be built at home by cementing thin balsa strips together and cutting the wheels from the built-up sections thus formed. Light weight celluloid wheels can be purchased which give to the landing gear a very realistic appearance.

Four upright struts are formed of split bamboo which hold the spreader axle in position. The spreader axle is cut from balsa and sanded to represent the wing curve airfoil as shown in the drawing. This gives additional lift as well as providing a sturdy brace section in place of the usual wire or bamboo axle found in models of this type.

The spring axles are formed from steel music wire .029" diameter and are cemented to the upright struts. It is a good plan to wind the cemented axles with fine thread so that they will be firmly secured to the struts. The wheels

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are held in place on the axles by cementing small glass beads on either side.

Elevator and Rudder

On a smooth board or work bench top draw out the design for the elevator and rudder. Pins may be placed along the outside of this design to form a certain outer limit when shaping the frames.

Strips of split bamboo $\frac{1}{32}$"x$\frac{1}{16}$" are heated over a flame and shaped to conform to the design so that they will hold their shape when laid inside the pins on the outline.

The elevator is next cemented in its place on the fuselage. It is set for level flight. Be sure that the plane of the elevator surface is parallel to the top surface of the motor stick. If you get any angle of incidence or depression to the elevator your model will be sure to stall or dive.

The rudder frame is cemented on the rear of the fuselage set for straight forward flight. Study the model from a distance of a few feet and sight along the tail control surfaces to check the setting. Any deviation from the normal guiding line of flight can easily be detected in this manner.

Motor Stick and Propeller

The motor stick is shaped from ⅛"x ¼" hard balsa. It is sanded at the rear to form a tapered vertical edge. This vertical rear edge fits snugly into a slot cut in the body former at that position in the fuselage.

The front of the motor stick is held by a music wire clip cemented to the balsa cross beam mounted in the N. A. C. A. cowling. After the motor stick has been cut and fitted it can be completely coated with a thin layer of cement.

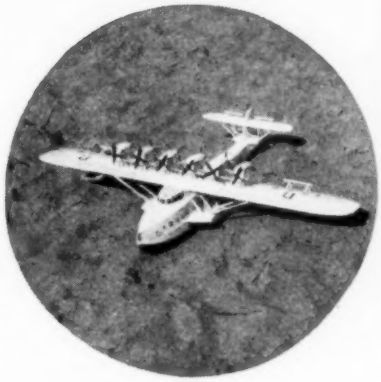
This strengthens the wood and allows many more turns of the rubber without the use of wire cans along its length to keep it from bowing under the strain. When the cement coating is dry the thrust bearing and rear hook can be mounted on the motor stick.

A 10-inch true pitch propeller is needed to fly the model properly. This is best when carved from a true pitch blank. A true pitch propeller blank has been previously shaped so that the actual carving job is very simple.

One has only to cut and sand out the inside surfaces of the blades so that

(*Continued on page* 56)

An Attractive Scale Model Do.X



HERBERT LORENZ of Chicago, recently completed a 36½" true 100% solid scale exhibition model of the world famous Dornier Do.X flying boat. The model has been on display in the Popular Aviation offices for some time, where much attention was received.

Herb is a German lad of 19 years and has been in this country for only the past 2½ years.

The hull of his model was carved out of a block of solid balsa 30" long, by 4" wide, by 5" deep. Holes were drilled to represent the passenger windows and then covered with small discs of celluloid.

The wing was made in a single panel size 36½" long, by 7½" wide, by 2" thick. An ordinary wood plane was first used to bring down to the rough shape required, then with various grades of sandpaper finished to the exact contour specified in the plans.

Final assembly was a mere matter of glueing the wing onto the hull top and attaching the lesser units and struts in place. For the most part the coloring scheme is basically white throughout except for that part which rests in water.

The plans followed were those of the Model Aircraft Engineering Company.

Col. E. V. "Eddie" Rickenbacker, America's Ace of Aces, officially credited with 26 air victories

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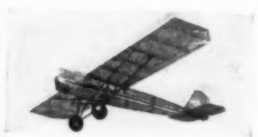

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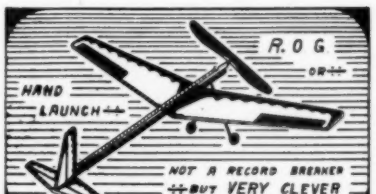

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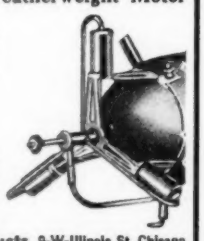

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Read the facts about Harvard in "Red Crime in Blue Blooded Boston" by Carter Dale in the May issue of REAL Detective Tales, now on sale at all news stands.

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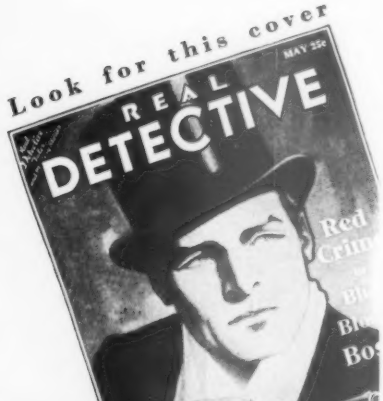

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WOMEN'S ACTIVITIES

EDITED BY **LOUISE THADEN**

FLIGHTS, rumors of flights, and the National Air Races are claiming the attention of most of the women pilots these days.

Ruth Nichols is doing things with a vengeance in her Crosley Radio Lockheed, which she and Clarence Chamberlin have partially remodeled for record flight flying. "Poncho" Barnes of San Marino, California, has tuned up her low-wing Travel Air, little brother to the famous "Mystery Ship," for speed records.

Louise Thaden

"Chubby" Miller, she of over water flying fame, has things up her sleeve now that she has recovered from her crash at Jacksonville. Women's endurance records are also in the air, as well as distance flight records. Looks as though this would be a busy season for the women.

* * *

The New York-New Jersey, and Middle Eastern sections of the 99's, national organization of women pilots, are planning a one-day air meet to be held at Valley Stream, Long Island—staged and participated in by women pilots.

There will be closed course races, several "funny" races, a parachute jump, acrobatic flying exhibitions, and a special feature flight. Amelia Earhart, Ruth Nichols, and Blanche Noyes will be a few of the "headliners" present.

* * *

Fay Gillis, caterpillar club member, writes from Russia that the Russian government has promised her she could fly very soon. Fay said, however, that she was not holding her breath until that time arrives.

It seems that conditions in Russia are not quite so comfortable nor agreeable as they are in this country. It is rather difficult to keep warm; and potatoes and meat seem to be the principal diet, as Fay sent in a call for a new way to cook potatoes.

"No matter how you slice them, they are still potatoes," she writes.

There is an aeronautical museum in Moscow, where Fay spends a great deal of time. In one of the large rooms there is a model of a model airport. All boundary lights are submerged, and all the buildings have glass roofs. Fay made the comment that she thought this feature would cause a number of accidents due to the curiosity of the pilots.

This airport also has a seaplane base. The most unusual thing of all is that there are no high tension lines around the airport. You remember the comment Will Rogers made to the effect that all you had to do to find an airport over here was follow the high power lines until they got pretty thick, and there would be the airport right in the middle of them.

Although slightly exaggerated, it is none the less true that our airports have entirely too many wires around the borders. They should all be underground, and probably will be some of these days.

* * *

I have a letter here from Mrs. Suzanne M. Potter—one of the real old timers in aviation—who lives in Arcadia, Calif.

Mrs. Potter purchased her first plane in the spring of 1919—in the days when you paid for the airplane first, and then took it up to see whether it would fly, and, if so, whether it would stay together without added bailing wire and a few extra reinforcements on the longerons and struts.

Mrs. Potter's first airplane lasted exactly eight days, but undaunted, as folks in those days had to be, she bought another which lasted a little longer than the first, until October, 1919, in fact.

Rather dismayed, but still undaunted, she purchased one of the Curtiss Oriole's that Casey Jones made famous. Not many of us remember the "Mississippi Valley Aviation Association," one of the first attempts made to organize aviation promotion and interest. Mrs. Potter was appointed by the governor of her home state, Wisconsin, to represent them at the first conference held in 1920.

In 1924 Mrs. Potter gave up active participation in aviation, but the work is being ably carried on by her daughter, who is president of the Girls' Glider Club at Madison, Wisconsin, and is learning to pilot an airplane.

Mrs. Potter, who spends her winters in California and the rest of the time in Madison, writes that she had many amusing experiences in aviation in those early days, and maybe you will hear from her directly through the pages of POPULAR AVIATION soon.

* * *

Blanche Noyes, who flew to Florida recently in a Great Lakes, sold her ship down there, and came back to Cleveland rather prosaically on the train. At the moment she is without an airplane.

* * *

Marjorie Lesser, New York's governor of the 99's, has taken her Moth out of winter storage and is flying out the kinks from the Albany airport.

* * *

Amelia Earhart has flown the autogyro and says she got a bigger kick out of flying than she did when she soloed. Amelia, by the way, learned to fly in California in 1920.

(*Continued on opposite page*)

Women's Activities

(*Continued*)

From advance notices of tentative plans, it looks as though 1931 were going to bring an innovation in derby racing in connection with the National Air Races. So far only two derbies are planned for the entire race project.

A transcontinental coast to coast derby with Washington, D. C., as the eastern terminus, the contestants then returning to Cleveland for the finish. It is divided into two competitive groups, one for men and one for women pilots, with a Sweepstakes Trophy and Purse which will afford competition to both classes.

The second cross-country event is a free-for-all speed dash open to either men or women, either non-stop or control, at the pilot's option.

These two events will certainly be the essence of competition, and will, in the first instance, depend almost entirely upon the skill and navigating ability of the pilot, as it will be a handicap affair, while the second event will depend on the speed of the plane as well as the navigating ability of the pilot.

At Last! I Solo

(*Continued from page* 14)

ened out and, seemingly bound to beat down my good intentions not to ground loop, she began swerving to the left.

A lightning movement on the right rudder and application of throttle remedied the situation. The plane was losing her speed and the run became straighter and more certain.

Taxiing up to the apron, Fred came running out to meet me with a smile that far eclipsed any dental ad I had ever seen. How relieved he must be that I had made such a nice solo flight!

I GREETED him with, "I didn't ground loop!" as we shook hands and he congratulated me on a good solo flight.

"How did I do? How was that landing? Was it on three points? Did I bounce any?" I asked all in one breath.

"It was just fine—a perfect three-pointer. I thought at first it would be a two-wheeler, but you brought the tail just in time, but you certainly came in 'hot.' It was very well done, though," was the smiling answer.

If Fred said so, it must be true and it made me extremely happy. I began noticing that here and there a pilot or mechanic loomed into sight from behind hangars and planes where they had hidden until I had landed safely. They probably figured if I caught sight of them watching me I would become nervous.

How surprised they would have been had they known I was far more relaxed and at home than I had ever been before.

This, my first lone flight, was by far the most thrilling moment of my life and I *didn't* ground loop.

Ground Strafing

(*Continued from page* 34)

come to take a hand in his game. Anyhow, he went into a nose dive of his own as though the whole Allied air force were on his tail.

"What happened next can only be explained by assuming that the boche pilot was looking back over his shoulder at me, trying to figure his best way to escape the menace of my Vickers guns, and that at the same time his comrade below suddenly realized what was taking place.

"I am sure none of my bullets took effect because my aim was necessarily very poor under the circumstances and my nearest enemy seemed to have perfect control of his diving plane.

"But his margin of safety was desperately slight at that altitude and at the very instant he must have figured on straightening out, the man below came zooming up to join the battle, doubtless calculating that he could get above me while I was engaged with the other fellow and before I could check my own dive.

"Boche met boche in a head-on collision, the two Fokkers coming together with terrific force.

"A huge sheet of flame enveloped both ships and they fell together, locked in a death grip like two fire-breathing monsters of a prehistoric age.

"Both pilots must have died instantly in the double explosion.

"It was all over so quickly I scarcely could realize what had happened and I straightened out my own ship just in time to save myself from a crash either against the German planes or on the ground beneath them."

Ingraham paused as though speculating on the moral values involved in his story, then shook his head impatiently as though dimissing the thought of a possible retributive justice.

"They fell in Allied territory," he concluded, "but I didn't follow them down or make any effort to verify the double victory. I was content just to have seen the finish of a couple of ground strafers who got what was coming to them."

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How to Build the Heath Parasol (*Continued from page* 39)

turpentine as a lubricant. Use center punch at intervals, whenever the drill refuses to bite.

After the leaves are shaped and drilled, retemper them. To do this bring them to a white heat and quench suddenly in oil. Then put them into a bath of molten solder for about five minutes. Withdraw the leaves and let cool in air.

Make a spring clip from V-549 and rivet (V-550) at its center to the second spring leaf. Assemble the spring, put the spacer (V-551) between the clip ends and bolt (V-548) the ends together. Make a clamp (Detail No. 26, fuselage print) from V-552 and fasten around the spring to the bottom of the fuselage with the same bolt which fastens the bottom longerons to the stern post.

Bolt (V-547) the stub end of the tail skid to the fitting at the rear of the lower longerons. Solder the bolt head to the fitting on the fuselage with the threaded part outward.

The Turtle Back:

THE fairing (V-561, 562 and 563) which forms the turtle back is held in place by a series of five plywood bulkheads (V-560). The fairing strips are butted against the first or largest of these bulkheads and are set into slots sawed into the edges of the others.

The first three bulkheads are lightened by cutting holes in them. The fairing is placed with its narrow edge out. The dimensions of the bulkheads are clearly shown on the fuselage print. The fairing is glued (V-569) and nailed to the bulkheads.

Small plywood blocks are nailed and glued to support the fairing at the first bulkhead. The center fairing strip is fastened at its rear end to a former or bulkhead made from V-566. The bulkheads are fastened to the fuselage with clamps (V-568) and bolts (V-567).

Side Fairing:

A LONG strip of spruce V-564 is fastened along each side of the fuselage midway between the top and bottom longerons. This is lashed to the side struts with "tinned" wire (V-75, March issue of POPULAR AVIATION) and is made with a long taper from the cockpit to the ends.

The Bottom Fairing:

THE ends of two strips of spruce (V-565) are first soaked for a distance of 18" in boiling water until pliable and then bent edgewise in a jig to the curve shown in detail No. 5 (fuselage print). These when dry are tapered at the ends and fastened to the bottom of the fuselage.

Spacers made from scrap plywood, nailed and glued to the inner edge of the bent strips where they cross the second, third and fourth bottom cross struts, will give clearance for the control torque shaft and the elevator cables.

Cross bars of spruce (V-565), 6" long, hold the two fairing strips parallel and furnish a means for clamping (V-568) to the fuselage. Make port frames around the landing gear axles and at that point where the lower end of the control stick projects two strips of spruce (V-565), 14" long are lashed to the underside of the lower longerons (A-B) to reduce the abrupt angle formed by the bend in the tube. These are tapered from the center to both ends.

The Nailing Strips:

STRIPS of spruce (V-357) are fastened between the side struts and beneath the top longeron with a No. 4-36 machine screw at each end of each strip. The spruce is channeled on one side to fit closely the under side of the tubing and strips of sheet steel (V-321) run from each No. 4-36 machine screw to the nearest bolt in the adjacent fittings.

The tubing around the door, also, has spruce nailing strips bolted to it. These spruce strips continue from the back of the pilot seat to the front of the fuselage and to them the cockpit cowling and the fuselage fabric are fastened.

The Landing Gear:

TO DRAW the curve to which the axle tubing must be bent, put a straight line 22" long upon the floor or other flat surface. From one end draw a second line at an angle of 148 degrees from the first and 9 5/16" long.

Mark a point on each line 3 3/16", from their point of intersection. Using these two points as bases, locate a focal radius point of 8¼". Drive a nail at this point and with a wire and chalk draw the curve in the angle of the lines.

To prevent the tube from kinking while bending, make a form from a short piece of 2"x6" lumber. Saw off a corner at one end and round that end to a slightly smaller curve than that to which the tubing is to be bent. Channel the end and the rounded corner and one edge for a total distance of 16". Put the form and one end of the axle tube (V-620) into a vise, protecting the tube end from the vise jaws with another grooved piece of wood.

Slip a piece of 1" or 1¼" iron pipe over the free end of the tube and pull around the form. If you do not have a vise large enough or heavy enough for this work, use a piece of 2"x6" wood, 6 or 8 feet long for your form and attach two straps near the curved end, made of ⅛"x1"x12" steel and set 5" apart to hold the axle tube in its groove while bending. This wooden form can be nailed to a post close to the floor at its grooved end and held by a rope or chain or by nailing to the floor at the other.

Mark on the inside of the bend on the axle, the center point of the bend. Measure 9 5/16" toward the short end and saw off any surplus. Measure 22" on the long side and saw off the excess. Make two axles.

Taper the ends of the long sides in the same plane with the bend, for a distance of 6", to a thickness of 7/16". Drill a ⅜" hole centered ½" from the end and drive into it a 9/16" long spacer (V-623). Cut off the corners of the flattened ends and round them with a file or emery wheel so that they will not jamb against the bottom fuselage strut when bolted in their fittings.

Slip the brass collars (V-624) and rivet (V-634) them in place as shown in Detail No. 6. Put on the wheels (V-625) and the axle caps (V-621) and mark the axles for the cotter pin (V-622) holes. The wheels should rotate freely but should not have more than 1/32" end play.

Landing Gear Struts:

FROM V-637 cut two 18⅝" lengths. Reinforce one end of each piece for 2" with ⅝" tubing (V-638). Heat and flatten for 1" by squeezing in a vise. Reinforce the other ends (V-638) for 4" and flatten at right angles to the first ends. These second ends which are the lower ends of the struts are flattened for 1½" from the end and for an additional 1¼" diagonally along one edge. (Detail No. 6). This is to provide clearance for the spreader tubes.

Drill in the lower ends a 17/64" hole centered 17⅜" from the upper end. The holes in the upper ends are not drilled until the landing gear is assembled on the fuselage and should be drilled with the fitting in place and with the end butted against the longeron. A 13/64" hole will be drilled. These two are the landing gear front struts. Make two more struts like these from V-638, reinforced with V-640. These are the landing gear rear struts.

The Axle Spreaders:

SAW four 23⅝" lengths from V-639 and reinforce all ends for 2½" with ½" tubing (V-640). Heat and flatten the ends of each piece for ¾" and drill in each piece two 17/64" holes centered 22⅝" apart. (See front view Landing Gear Print). Have at least 5/16" of metal between the holes and the ends.

Landing Gear Fittings:

MAKE four clamp fittings (V-648) as shown in Detail No. 2 to fasten the upper end of the landing gear struts to the lower longerons. Make from V-648, two clamp fittings, one for each axle end as shown in Detail No. 1. From a 2"x¾" piece of sheet steel (V-648) make a tie link as shown in Detail No. 1. The two 17/64" holes are centered 1¼" apart.

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(V-479; group 7) make a bearing bracket as shown in Detail No. 5 and bend as shown in Detail No. 1. Drill in this, also, two 17/64" holes centered 1¼" apart. This bracket acts also as the rear tie link for the bolts at the upper ends of the axles.

From V-633 make four wire pulls as shown in Detail No. 4, to be attached at the lower ends of the spreader tubes by the spreader bolts (V-645). From V-649 make two triangular fittings to be bolted to the front ends of the lower longerons, to which will be attached the front landing gear cables and the wing drift cables. (Detail No. 8).

From V-627 make two safety yokes or clips as shown in Detail No. 3. Have the ends of the small loops welded shut. From V-636 saw two lengths 2⅜" each as spacers or perches for the shock cord. Square up the ends of these spacers with a file. Cover the spacers with a length of rubber hose (V-650).

Put a thimble (V-630) through the eye of each of the four turnbuckles (V-631) and loop the end of a 27" length of ⅛" cable (V-628) around it. Solder the ends of the loop side by side for 2¼", wrap with "tinned" wire (V-75, group 4) leaving ⅛" inspection openings every half inch. Sweat solder through the turns to make a solid end.

Attaching the Landing Gear:

ATTACH the struts to the fuselage (V-647). These are in pairs with a ¾" tube in front a ⅝" tube in the rear. Bolt (V-644) the upper ends of the axle and spreader tubes to the fittings at the center of the second bottom cross strut.

Note in the side view drawing of the fitting, the order of assembly, the axle in the center of the clamp fitting, the spreader tubes outside of the fitting and the tie links outside of the spreader tubes. The control bearing bracket should be on the rear side.

Assemble the struts, spreaders, perches and wire pulls at the lower ends on V-645. The axles go over the perches and through the safety clips. Attach the turnbuckles to the wire pulls at the spreader ends and measure on the cables the distance to the wire pulls on the fuselage.

When measuring the length on the landing gear cables, be sure that the landing gear struts form a right angle with that part of the lower longerons between the second and third bottom cross strut, and that two or three threads are exposed in the turnbuckles. Bend a loop around a thimble (V-630) in each forward wire pull and solder as before. Bend a loop around a thimble in each rear cable at the proper distance to be bolted to its fitting to the rear on the lower longeron.

Cut the shock cord (V-629) into two pieces and wrap over the upper side of the axle and the under side of the perch in the customary manner as shown in your print. (Detail No. 7). Have approximately the same tension on each turn and make four complete wraps. Bring the ends together and lash side by side for a distance of at least 2" with strong cord. You will later shrink and waterproof these lashings with "dope." Mark and store the unused materials.

This completes the work for the month. Next month we will complete the motor mount, flying struts and the instrument board.

Musselman's Airwheels

(*Continued from page* 43)

left a trail of broken ice behind, but his ship had been held up by the large tires in the same manner that snow shoes prevents sinking into the snow.

This new type tire can be built as large or as small as desired. This is shown by the fact that a tire for gliders is now being built regularly, and another tire for advertising purposes has been built large enough to support the DO-X any time it wishes to take to land. This latter tire is 12 feet high and four feet through. It operates at an air pressure of one pound.

Of course, since that first day when Mr. Musselman watched Airport Manager Fulton test his tires, the inventor has had numerous opportunities to ride his own tires and has actually covered many thousands of miles in test planes.

But it was only recently that he rode with a pilot who persuaded him to take the stick for about five minutes in the air. That was enough for the inventor. He is now anxious to start training for a pilot's license.

"That one turn at the stick was one of the big thrills of my life," said Mr. Musselman. "I've only had one greater, and that was when I received my first letter from a pilot saying that he believed his life had been saved in a recent crack-up by my tires."

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The Triplane Will Return

(*Continued from page* 22)

this time than toward further work with monoplanes.

In all branches of the air service, the biplane almost completely displaced the monoplane, even when the monoplane was a prevailing type at the beginning of hostilities.

There has been comment upon the fact that the interplane bracing heretofore employed on biplanes creates a considerable amount of useless parasitic resistance, and therefore, that the self-supporting cantilever monoplane wing is again more efficient.

As a matter of fact, properly designed interplane resistance contributes little head resistance, and again, there is no real reason why the wings of biplanes and triplanes cannot be made of the cantilever type as well as monoplane wings.

Some years back a number of biplanes with self-supporting wings were built. Among them was the old Curtiss "Wireless," and a ship known as the Christmas.

If the size of transport planes is to increase in the future, it seems almost certain that the triplane arrangement will be adopted eventually in order to hold the wing dimensions within reasonable limits and to obtain the other advantages outlined above.

It is not likely that the matter of interference will play such an important part with the large triplanes because of the great gap permissible on such ships. Further, a triplane structure adapts itself admirably to the installation of large wing motors for the interplane bracing very greatly reduces the bending moments now so troublesome with cantilever wing monoplanes.

The fact that such power plants can be imbedded in the center surface further reduces the parasitic resistance of power plant installation below that of the installations now common on monoplanes.

The greater longitudinal stability possible with the triplane is an added factor of importance in making comparisons. Various combinations of decalage can be employed so that the total movement of the center of pressure is reduced to a minimum, reducing the work of the pilot and acting as a safeguard to the passengers and cargo.

The comparative great travel of the center of pressure across the wide chord of the monoplane wing involves much piloting and is a primary source of wasted power because of the unavoidable oscillations and deviations of the angle of attack. By the use of superposed surfaces it is possible to build stability directly into the ship, a feat not possible with the single surface.

For the small sport-plane, the triplane lends itself admirably. Compactness, always a primary virtue with the sport plane, permits of storage in limited space and it is a simple matter to construct an efficient triplane having a wing area of 150 square feet with a span of 15 feet or thereabouts.

Such a wing structure is simple and light, embodying strength and rigidity with low cost of construction. Repairs are much simpler and cheaper than with a cantilever monoplane type, and up to spans of 24 feet, these wings can be very easily constructed with a minimum of interplane bracing.

Light planes of the triplane type have been successfully constructed in past years having wing spans of less than 20 feet and provided with engines ranging from 10 h.p. to 25 h.p.

Among these early productions of light triplanes were those of Sellers, Bates, Ricci and Matthews, and in mentioning these ships we must not forget the earliest of all triplanes, the historic old "Avro" built by A. V. Roe in England, the progenitor of a long line of successful ships built by Roe.

There is one inherent feature of the triplane that undoubtedly will be employed in the future, for this property exists in no other machine or wing grouping. In short, this is the ability to vary the the speed range through a much greater series of values than is possible with a monoplane or biplane.

For high speeds, demanding heavy wing loading, the center surface can be turned into the neutral or no-lift position so that all of the load is carried by the top and bottom surfaces. When landing, or when carrying heavy loads, the center wing can be turned down into the lifting angle so that all of the surface is effective in carrying the load.

The center surface is comparatively lightly loaded, and such adjustments are easily made on a ship of this type so that safety is combined with flexibility.

To sum up the matter, the triplane principle of construction offers many practical advantages over the monoplane and is therefore well worthy of further development for both the small light-plane and the transport.

There is no doubt but what the delay in this development is largely due to the general understanding that a triplane wing assembly is less efficient than a monoplane wing. This is true aerodynamically, but this factor should not be taken alone to the total exclusion of the many advantages and the compensating aerodynamic factors that bring the overall efficiency, maneuverability and stability of triplanes up to a very high degree.

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Rathbun Dodges Brickbats

(*Continued from page* 27)

in the fact that suitable lubricants were not applied, making it necessary to tear down every 50 hours when there was time or else throw the dirty engine away and install a new one.

The lubricants, which must be given credit for the stamina of present engines, most emphatically are not the product of the airplane designer. If it were not for the progressive oil refiners we would still be smelling castor oil. Check over the old engines part by part with the new ones and see where there is any change.

(c) Lots of the early planes dived, looped, flew inverted and went through all sorts of maneuvers without falling to pieces. We built one that flew 118,000 miles on exhibition, carrying thousands of passengers without a mishap and she was wood—all wood.

On the contrary, I have seen and heard of a good many modern ships that have fallen to pieces, and a number of them not so far from where I live. As a matter of fact, I was pallbearer on one of these jobs last July.

The ship in this case was one of the newest of the new, extensively advertised and painted—oh, so beautifully. After about 150 hours, the engine leaped overboard, carrying most of the front end of the fuselage with it.

(d) I cannot recall any racing planes with 400 horsepower motors in 1917—but there might have been. However, this I am positive of—that a good deal more than 150 m.p.h. was done with 110-130 horsepower. The "400" Libertys came out later and were installed principally on large bombers and two-seat fighters.

Aerodynamic design was not unknown in 1917; in fact, most of the principles laid down in those days are the very ones that the slide-stickers are still working. It was during the war that aerodynamic research was most active, and when millions of dollars were available for this work.

(e) Before the war there were many inherently stable ships designed along various lines, but in the war stability was sacrificed to maneuverability because a ship cannot be maneuverable and perfectly stable at the same time—it is too stiff.

There is no difference in the control system in the present ships from the standard systems in 1917. Check this up. And again, flying "hands off" is nothing new—it has been done repeatedly from the beginning of aviation.

(f) Here you speak of the old-timers being responsible for tail-skids. Don't believe it. The early machines such as the Bleriot, R. E. P. and several American ships had wheeled tail members, but they were compelled to discard them and take up with skids because the wheels caught in the tall weeds.

Now, we have mowed and rolled airports where there are no weeds to justify skids, and yet the present-day designer keeps right on using skids without a thought because it says skids in the books.

And again, wooden frames are not so bad after all. They throw up a lot of splinters when not taped, it is true, but this is about all we can say against wood. With turnbuckle construction instead of veneer bulkheads, things are not so pretty, but then there is no present need for wiring and turn buckles. Pound for pound, spruce is more rigid than steel (look up the modulus of rupture for both materials). The main cry of the ancients against steel construction is that it is needlessly heavy—and it is.

AND now we come to a pleasant letter by Mr. H. H. Packwood of Baton Rouge, La. This gentleman is of an investigative turn of mind and is not satisfied with standardized design a la copy-cat. As Mr. Packwood divulges some of his secret ideas to me in this letter, I cannot publish them in their entirety, but will give you the beginning and end of the letter:

"I have read several of your articles appearing in POPULAR AVIATION and I always enjoy them very much. Your last one, 'The Years Go By But Aviation Stands Still' has been of the most interest to me. I like your way of putting things without fear or favor, especially where they are truthful."

(*Continued on page* 55)

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Experiments in Gliders

(*Continued from page* 36)

ords. Some of the specifications are as follows:

"Monoplane, chord 6 feet on 32-foot center panel, tapered 20-foot wing tip panels, Goettingen 441 airfoil, two spar (box) construction, flexible trailing edge, truss type ribs. Nacelle of airfoil section, controls carried on outriggers, weight 245 pounds. Length of nacelle and outriggers 26 feet.

"My rocket experiments were halted when my glider failed in load tests. I may build a glider, designed especially for a rocket motor, next summer, provided that I am not 'broke' by that time.

"I might add that I had the first explosion of a rocket just a few days ago. The accident occurred when testing for minimum size of jets using a 1½ by 12 inch metal shell rocket. The explosion did no damage except to completely destroy my registering apparatus and toss the four-inch blanket blocks twenty feet or so."

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HAROLD A. SAGE
MANAGER

The Doodlebug

(*Continued from page* 19)

set out to build what I call the 'flivver plane of the future.' Bear in mind that the Doodlebug is exactly that, a successful experiment to build a thoroughly practical air flivver.

"Three main objections existed to the ordinary type of airplane when considered for general use such as I planned for my air flivver. They were not safe enough for private use, not of sufficient utility and not easy enough to learn how to fly.

"By meeting the safety requirements, we pretty much satisfied the other conditions, though the Doodlebug's small dimensions contribute largely to the plane's usefulness.

"High speed planes require a skilled navigator. Taking off and landing are maneuvers that need a considerable course of training. Therefore the Doodlebug was made capable of rising and landing at a very low speed.

"In the air, safety is a matter of overcoming the stall and spin dangers. The devices used on the Doodlebug and more particularly the way they are hooked up constitute the real heart of my monoplane.

"Stalls are prevented by automatic slots on the leading edges of the wings. Any attempt to stall causes the air to strike the wing surface in such a way as to open the slots, which remain closed in high speed flying. These, with trailing edge flaps and the tail stabilizer are the three safety features and they are linked in a unique manner.

"In the cockpit to the left of the pilot is a little lever like the hand brake of a Model T Ford. It is called the slow flying lever. When the pilot pulls it back, the trailing edge flaps on the wings drop and with checked speed, the leading edge slots open, of course.

"But the lever is connected with the tail stabilizer as well as with the flaps, and the stabilizer also drops when the lever is pulled. The hook-up is so adjusted that the tail stabilizer exactly counteracts the change in balance resulting from the drop of the flaps.

"All you have to do in landing is throttle down, pull the slow flying lever and hold the ship level. With speed reduced to about 30 miles an hour, the Doodlebug will settle at an angle of three to one and brake to a stop after a 40-foot roll.

"Forty-five-inch shock absorbers make even clumsy landing seem gentle and the wide tread keeps the plane upright even under most adverse conditions. It can't nose over. Compare this landing with the nine to one angle, 40 to 50-mile speed and 200-foot roll of ordinary airplane landings and you can see what has been accomplished.

"The Doodlebug will take off in six seconds within 140 feet at a speed of 30 to 35 miles an hour and at a 40-degree angle. This brings us into the question of usefulness, but I can make the picture clearer by telling you about a spectacular stunt I pulled at the National Air Races.

"The Doodlebug took off and landed without difficulty in a circle with a diameter of 150 feet and outlined by flag markers. Not a flag was disturbed.

"I invited the Autogyro, which I consider the Doodlebug's only competitor in this respect, to duplicate this feat. It succeeded very well in landing, but could not get off the ground without breaking the circle.

"You can see what this ability to take-off and land in a small space adds to the usefulness of the Doodlebug. It means that outside metropolitan areas the 'flivver plane' can be owned and operated to actual business advantage by many people who ordinarily never would consider airplane transportation. It can take-off and land literally in one's own back yard."

McDonnell was asked what sort of reception the Doodlebug had been given by people in the aviation world.

"Well, the National Advisory Committee for Aeronautics thought enough of it to buy it," he replied. "Orville Wright is a member of this peculiar body which doesn't come under any government department, reports directly to the President and spends a million and a half a year for the benefit of aeronautics. The committee will publish its official findings on the Doodlebug before long.

"But I've had plenty of advance indications that the big shots in aviation like the Doodlebug. David Ingalls, who as assistant secretary of the navy for aeronautics is the civilian head of naval flying, was one of five men whom I invited to solo my monoplane and he did so very cleverly. Frank Hawks and Benjamin J. Brewster 3rd were two other successful soloists."

Then came the inevitable reporter's question. "What does Colonel Lindbergh think of it?"

"You *would* ask that! Well, as a matter of fact, he has expressed great interest in the Doodlebug. I flew the plane from Miami to the naval auxiliary station at Anacostia, D. C., and to Langley Field. I got into touch with Colonel Lindbergh in New York and invited him to solo the bug but he arrived too late to do so.—But I'm sure Lindbergh will be an ardent Doodlebuggist one of these days!"

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Rathbun Dodges Brickbats

(*Continued from page* 53)

Then we have a very forceful and understanding letter from Mr. D. B. Atkinson of Winnipeg, Canada. Mr. Atkinson, having real experience, is doubly interesting in his commendations. He speaks thusly:

"My heart yearns toward any man with courage and vision enough to cut diametrically across the path of the crowd. Your article did me good. I have a vicious hate for public back-patting which is the mutual indoor sport of certain of the flying fraternity (very good—very pat—J.B.R.) And that includes the industry from designer down to the engineer's apprentice. . . . I hope you never have to squirm for your courage and temerity for deigning to question the Gods on Olympus. I don't think you will, at least not until passenger aircraft can earn profits on their own merit."

After this, written by a man with experience in commercial aviation, I feel like a Main Street Crusader, and I trust that Mr. Atkinson's confidence in me will not be betrayed. Up and at 'em.

From Manhattan, Kansas, comes a letter signed by Mr. Chauncey Lundberg, who is a student of aeronautic history and who ends quite a lengthy letter by the words "Yours for something new in aviation."

The length of the letter prevents it from being printed in its entirety, but I will make excerpts from the letter showing that I omitted mention of a few old time ideas that are now being paraded as brand-new and right off the griddle:

1. The first metal propeller was used on the R.E.P. monoplane in 1909. (This is correct; I don't see how I overlooked this.)
2. The airplane catapult, now pointed to as a recent innovation, was first employed by Langley, then by the Wrights in their first experiments and then by the U. S. Navy, 'way back.
3. Brakes were used in the early Curtiss and Voisin machines (also on the early Breguets-J.B.R.)
4. Robot pilots, now mentioned breathlessly in the sensational magazines, were patented in 1909 by A. J. Roberts, an English inventor.
5. Bleriot invented and flew a 10 passenger monoplane with a 100 h.p. engine in 1911. See a modern designer tackling a job like this.
6. Wing radiators were used by Capt. Page years back.

This is quite an assemblage of historical facts and there are still others that neither Mr. Lundberg or myself have mentioned.

So now we get back again to the contrary minded, Mr. H. G. Meier of Lakeside, Michigan, contributing the next epistle which is laid on the board. Mr. Meier at times waxes facetious—but I don't care, I like it just the same because his letter gives me a lot of kick.

"No doubt Mr. Rathbun's desk is piled high with exceptions to his article in the March issue of POPULAR AVIATION (check and double check), and I wish to add one more to the pile:

"Shame on John! He certainly landed tail high and ground looped. We readers follow aviation's progress step by step, eagerly digesting every article in POPULAR AVIATION, and then suddenly without warning find an article captioned, "The Years Go By But Aviation Stands Still."

"Please, Mr. Paul Clough! won't you take Mr. Rathbun for a ride in the little Aeronca out at Roosevelt field? Even though this little ship weighs but little more than 400 pounds, it will carry almost equal its weight. Show him how easily it flies and controls.

"Then fly over some nice muddy lake and push him overboard (naughty, naughty—J.B.R.). Otherwise he may wish to return the favor to you in some old Nieuport, and since you are still young and have your life before you, you should take no chances. The wings fall off those old crates very easily (not on the one I used, for it took two men the greater part of a day to do this trick—J.B.R.).

"I wonder if Mr. Rathbun attended the National Air Races at Chicago, and watched a pilot risk his neck trying to keep an old Curtiss Pusher right side up? Also saw the big Burnelli slide silently into land and discharge a dozen or more passengers? If so, how can he say that aviation stands still?

"Let us examine a photo of the autogiro. Perhaps we will find as much difference in design as we would by comparing a 1914 model automobile with that of a 1931 model. Also suppose we have a look at the Do.X. Not many like that in the old days (I hope not!—J.B.R.). The huge Bellanca does not favor many wartime ships.

"Henry Ford used the same model T motor so many years that one could purchase parts in grocery stores. We still use the old L head motors in our fine 1931 model automobiles (Yes, with quite a few things added—J.B.R.).

"The same four wheels, headlights, steering wheel, and I notice a man filling a radiator at this moment. The tires still become flat. We have four-wheel brakes on cars. We have but two wheels on the average plane so we use but two brakes. We have balloon tires on both. The same may be said of starters. (Mr. Ford thought so well of the Model T that he brought out the Model A).

"Mr. Rathbun would have us believe that the auto has made much greater strides in design than the airplane. The auto still contains the same motor under the hood. The radiator, steering wheel and brakes are still in the same location. What have we changed on the auto other than the appearance and type of body (We sit in an enclosed space instead of outdoors for one thing, and lubrication has become so improved that we can drive five miles without taking up the bearings—J.B.R.).

"We have improved every individual part that goes into the car (Very true—J.B.R.). Everything has been refined and made much stronger. The same may be said of airplanes (Not necessarily). It has been made so strong that the Curtiss Helldiver, developed for the Navy, will make a power dive with a load of bombs, for 10,000 feet followed by a fast pull-out.

"Our knowledge of stress analysis during the war was not sufficient to construct a ship of this strength (The principles of stress analysis have not changed in the last 50 years—J.B.R.). Is this not progress in aviation?

"Mr. Rathbun states: 'The trend in the old days was to produce a practical ship that would compete in cost with other vehicles of the time and to popularize aviation (Very true—I still say it—J.B.R.), and opposite this paragraph is shown a photograph of the modern sportsman's flying yacht of 1914 and quoted at a price of $200,000. (Whoever put this caption on the cut failed to state that this was an experimental plane designed for a trans-atlantic flight—J.B.R.) Whoopee! Also a little horseradish. During the war cost did not enter into the scheme of things, planes were built for results."

Then follows some comparisons with radio by Mr. Meier, which I have not space to reproduce. From all appearances, Mr. Meier is content with things as they stand, but it is quite evident that he did not closely study history.

THE little Aeronca has seen precedent in so many cases I cannot recapitulate all of them in this space. There have been light ships galore, many of which put up astounding performances.

(*Continued on next page*)

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The Sperry Messenger

(*Continued from page 27*)

way he could.

"One day he taxied a little Sperry Messenger in back of a Barling Bomber, which looked like a flying hotel. It had six Libertys in it, nine wheels in the undercarriage, and a ladder to climb from one cockpit to another. The tailskid looked like the trunk of a tree.

"The little Messenger was around back of it to show the comparative sizes of the two. The Barling Bomber pilot opened the throttle of the six engines, and with one puff blew the little Messenger over on its back."

Model Department

(*Continued from page 47*)

about 1/8" cupped or cambered surface appears before shaping the blade backs. The blade backs are cut and sanded so that the "prop" balances from the center shaft hole position.

A shaft of .029" music wire is inserted and secured with cement. The finished propeller is given a coat of wing dope to strengthen the wood. Small metal washers are used as bearings. Two washers are required and they may be slipped onto the shaft from the hooked end at this time.

Eight strands of 3/32"x1/8" model airplane rubber are required. The ends should be looped and secured by cementing with rubber cement and winding with light thread. The whole motor stick assembly is removed from the body when winding up the motor so that the maximum number of turns can be checked in relation to the pull caused on the stick.

Flying the Model

After complete assembly the balance of the triplane should be near correct. The lower wing will move towards the rear on the clip arrangement.

Unless the tail is very heavy this will be all the adjustment necessary for correct balance. The lower interplane struts should be removed when flying the model.

* * *

Mr. Ott wishes to thank Lieut. H. A. Reynolds of Syracuse, N. Y., a nationally kown model builder and experimenter, for his help in getting this material ready for publication. Lieutenant Reynolds' co-operation also assisted materially in the preparation of last month's article.

(A limited supply of large sized plans for this model are available upon request. Address your letter to Model Department, POPULAR AVIATION, 608 S. Dearborn St., Chicago, Ill. Be sure to enclose 4c (coin or stamps) to cover mailing costs.

Those writing in, may take the opportunity to express their views, favorable and otherwise, on the various articles appearing in this issue.)

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Rathbun Dodges Brickbats

(*Continued from preceding page*)

Among them I wish to point out the old Sperry "Messenger" which was of this type. An empty weight of 400 pounds is not so very light, and not so many of them lost their wings as Meier would like to have you think.

Yes, I went to the National Air Races and saw a whole lot of crack-ups as per usual, all of which were among the latest models while the old Curtiss type pusher kept on pushing—also as usual.

If Mr. Meier will try it, he will find that it does not take any great effort to keep one of the "tripods" in the air—Al Wilson was just being comical for the edification of the crowd.

As a matter of fact, this plane was a modern-built replica equipped with stick control instead of the old shoulder control. Shoulder control is just as natural as can be—providing your shoulders fit the seat.

In regard to the Burnelli, I have seen old Handley-Page machines carry more than 10 people 'way back in war times, and if you remember, one of these old from England with a good sized crew buses flew all the way to Mesopotamia and passengers during the war.

And I also remember the "Vickers Vimy" that flew across the Atlantic before Lindbergh ever thought of it, and what about the NC-4 that did the same thing but along another route? Is the Burnelli up to this?

About the autogyro I am silent. Perhaps it is, and then again perhaps it isn't. Time alone will tell.

Stacking motors along the top of the wings, as in the DO-X is nothing new nor even desirable.

A good idea of the huge transports built at the end of the war can be had by examining the British Standard Exporter, a book which is on view at the POPULAR AVIATION office. Some of these ships are colossal but unknown to the general public.

And what about the Gothas on the German side that did real work instead of loafing around airports?

As I said before, the trend was toward making a reliable popular price ship, and there were a good many of them in the early days that sold from $750 to $1500. There was not much in the way of speed, it is true, but they flew quite well.

Next comes a letter from a man who seems to have been mixed up with the game intimately, Mr. L. O. Simpson of Walla Walla, Washington, who wails over the high cost of crashing. Mr. Simpson is right about this cost thing which is hindering progress. Meet Mr. Simpson.

"I wish to congratulate you on your articles in POPULAR AVIATION, as they put aviation as it is. I hope you will wake some of these socalled aviation engineers to the fact that they are all hooey. In the first place, who wants a plane that has a high speed of 150 m.p.h. for private use. That is all right for transport work, but not for the private owner.

"It's about time these socalled manufacturers started to build planes for the poor man as well as the rich, because they will find out that it isn't the rich man that's going to fill his bread basket. Mr. William B. Stout said the same thing a while back and nobody ever hit the nail on the head squarer than he did.

"They can never make a plane safe, so why waste so much time on gadgets when after all, a plane is only a man-made machine just as a car is. And in honest frankness, no one can say that a car is safe.

"Do not misunderstand me. I am not a communist but only an honest American pilot who sees aviation through his eyes and not through his pocket book. For if money was a disease, I'd be the healthiest man on earth."

I have omitted a few paragraphs here and there, because Mr. Simpson feels so strongly on the subject of the high cost of flying that we could never get another advertiser if all of it were printed. If a pilot feels this way—what about it?

Mr. P. A. Thibaudeau, president of the Montreal (Canada) Flying Club, introduces a few arguments which can be best handled in chronological order as follows:

1. The autogyro is in its trial stage, and I can say nothing for or against the accused.
2. The Curtiss Tanager was an aggregation of fairly old principles, the slotted wing and the floating ailerons. It burned up, and so far I have heard of no new editions being built.
3. The Dornier DO-X is almost a direct replica of a design evolved many years ago when the flying wing idea first came into vogue.
4. Folding wings were used on the Handley-Page during the war.
5. Wheel brakes are discussed in an early part of this review. Oleo struts were used on the 1914 Breguet and the Handasyde. Retractable landing gear were used by Christmas in 1914.
6. Inverted engines were first employed by C. W. Roberts in 1912.
7. Records of speed simply mean loading on excess engine power to a point where the machine is nothing but a flying wing and impracticable for ordinary service. Proper lubricants have a whole lot more to do with endurance than any other factor.
8. The Diesel engine, while not primarily a new principle, is comparatively new to aviation. There was a German Diesel built for flight way back in the wartimes, but outside of seeing a picture of the engine, I know nothing of it.

And so it goes with the rest of them. I am not writing this simply with an idea of defending an arbitrary stand—I fully believe in my statements.

The Arrowhead

(*Continued from page* 18)

ever to obstruct the pilot's view in any direction, which contributes in no small measure to the facility with which easy and safe landiings may be negotiated. There are no blind spots.

With the use of the pusher type of propeller there are several other advantages. A propeller with no part of the airplane behind it is more efficient than one in front.

The truth of this is apparent when it is remembered that in a tractor machine the entire fuselage and tail surfaces and a portion of the wings and landing gear are traveling in the rapidly moving blast of air from the propeller, thereby increasing the resistance of these elements some twenty to thirty per cent.

Again, when the motor is mounted at the rear end of a short fuselage, it is comparatively easy and simple to silence the harrowing bark of the exhaust. Complete and perfect silencing can be obtained without serious loss in efficiency, just as is done today in the modern motor cars.

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The tailless airplane is not "just another airplane" but something new and startling. It has numerous points of superiority, is safer and more stable and is vastly easier to fly. With all these points in its favor, plus the lower cost to manufacture and consequently cheaper price at which it can be purchased, it may easily be the coming "Flivver of the Air," as Mr. Curtiss predicted.

Glider Club Experiences

(*Continued from page* 15)

knows what this means so close to the earth.

Down he came "like a bat out of Missouri" towards the ground and I expected to see the many many weeks of hard labor turn into a mere pile of kindling wood and torn cloth.

But low and behold, I was badly mistaken. The 110 pound pilot got control of the glider when he was about eight feet from the earth and lit with a thud that would have sent a thrill to the heart of the most daring pilot, but right-side-up and with wings level.

We all rushed to his assistance and arrived in time to see our tiny pilot crawl out from his sprawling position and hear him mutter a healthy "damn."

This proved that he was O.K. and we started looking over the ship for breaks. Two fuselage spars were broken; otherwise she was as good as ever.

The new spars were put in (at a cost of only $1.00) and our 110 pounder sternly declared that he would fly the contraption as she should be flown or break his neck in trying

—Duane T. Paxton.

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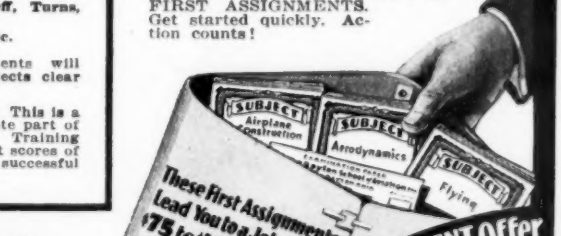

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Jimmy Doolittle

(*Continued from page* 24)

charge of the full flight laboratory from the start and was made available through the courtesy of the Army Air Corps."

So in the future, I predict, pilots who wing their way safely through fog and storm will always remember the debt they owe to Lieutenant James H. Doolittle and passengers of huge air liners will bless his name after they have been safely landed after thousands of miles of flight through fog.

Life is curious. It often deals some funny hands. In 1912 young Jimmie Doolittle, then 15, and something of a boxer, met a grown man for the amateur bantamweight championship of the Pacific coast.

That same night on the same boxing bill was another boxer by the name of John A. Macready. About twelve years later they met again, but not as boxers on the same evening's entertainment. Lieutenant James H. Doolittle congratulated Lieutenant Macready on his record altitude flights and Macready allowed that Jimmie was a pretty good flier himself having made a one-day flight across the American continent.

Last year the United States Army Air Corps lost Jimmie Doolittle as one of its active members. He resigned and became the director of aeronautical activities of an oil company, the same firm which had already placed Macready on its roster.

Who dares predict what these two will accomplish along the sky trails of courage from now on?

Record by Mistake

(*Continued from page* 31)

at about 4,800 feet. Through the glasses it could be seen that Miller had put his foot through the wing fabric.

Again the plane started to come out of the spin and go into a tight spiral. Miller leaned over the cockpit, after extracting his foot from the wing fabric, then leaped into space as the plane was completing its *twenty-second spin!*

Downward he plunged. Those in front of the hangar counted to the proverbial ten. Still the 'chute did not open. Spellbound, their subconscious minds again repeated the count. The plane sped past the plunging pilot. A moment later a crack like a pistol was heard and the billowy cloud of silk opened.

A cloud of dust broke into the air and showered itself hundreds of feet upwards as the plane crashed into a nearby field. A moment later—it seemed ages—the sound of the impact came thundering back across the field. A few minutes later Miller landed unhurt ten feet from the front door of his office-hangar.

The crowd gathered about him. "What happened?" was the question asked by everyone present.

"Well, I just tried to right the ship after the second spin and it would not respond to the controls. As I left the plane everything went black for just a moment and then cleared up again. I counted to ten and saw the plane still above me and still spinning, so I started all over again. Part way through the count it passed me and I pulled the cord," he answered while calmly smoking a cigarette.

Miller estimated the plane completed its twenty-second turn at about 4,000 feet. He pulled the rip cord at 1,500 feet.

"It might be a record," said Miller later, "but I won't advise anybody to try and better it. But if you want to see a unique sight watch a plane crash from a seat in a parachute. I could see the shadow of the plane on the ground as it was diving downward and it looked as though the ground was coming up to meet the ship. From the air it looked as though a bomb had struck when it crashed. Dust rolled upward in the air more than 200 feet—and $40,000 buried itself in a tangled mass of debris."

Yes, that *is* some kind of a record.

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Flying Lessons

(*Continued from page* 42)

hard at the top of the bounce and then started out once more to circle the field before attempting a second landing.

This was awful. He had made a bungle of the whole thing and it was not so much the humiliation of failing on the landing as the betrayal of Ed's confidence in his ability. He had pulled off this failure through neglecting advice and outright carelessness or, worse yet, through inattention.

He was now back in line with the landing lane once more, and now came the second battle with the controls with the grim determination to make a three-pointer out of it or die in the attempt.

His judgment told him that his speed was just about right and that he was settling at a rate that would bring him into contact with the earth at the right point. His eyes were strained to catch the slightest change in height above the rapidly flitting earth below him, and just at the critical moment he pulled back on the stick.

Well, it was not a perfect three-pointer, because the wheels hit just a trifle in advance of the tail skid, but it was close enough to being a three-point landing to call it by that name. At least there was no bounce.

After rolling a short distance, Bob pulled back his goggles and awaited the figure approaching him on a trot. He dreaded this meeting, but resolved to face the barrage of roars without explanations or alibis.

However, he was all wrong about this, for Ed's face was wreathed in smiles as he extended his hand over the edge of the cockpit for a hearty handshake. Pleasure and relief were both strongly registered on the pilot's face as he opened up his guns with congratulations—not censure.

"HOT diggity dog," yelled Ed. "I am forgiving a whole lot of things just to congratulate you for your presence of mind. In the first place you didn't go all to pieces when you found that you were lost. And that's something.

"We had the motorcycle out chasing

you up, for I knew right away after you leveled off that you didn't know where you were. That has happened around here many times before, and before your stunt, it always ended up with a lot of trouble when the student went screwy and tried to land in a vacant lot or a strange field.

"The minute that you leveled off and started to turn left instead of right I knew that you were all wet and as much at home as a cat in a strange garret. If *you* were scared, you should have been here and heard me pray.

"Second mark of merit to be scored up to your credit is the way that you made that landing. Yes—wait a minute—you did make a foozle on the first trip, but the big thing that you did was to open up the throttle and pull her off again instead of hop-scotching along and knocking the sticks out of her like the rest of the gang usually do.

"This shows one of the best traits in you—the ability to recall instructions and act on them even though you are in trouble at the time. No, not one word of blame. You did a whole lot of things that were not on the original program and got away with them.

"When you took-off, you started climbing like a balloon, and I'll bet that it was a big surprise when you looked at that altimeter—wasn't it?"

Bob smiled and nodded assent.

"That's just it. A ship handles differently when she's shy of a passenger or two, and she climbs fast. The first time you tried the landing you found that 170 pounds minus made a lot of difference in the way she settled and the way that she held up her speed—isn't that right?"

Bob nodded again, and with this friendly talk he was rapidly regaining his composure. He was really very fond of Ed in spite of the many roars that Ed had let loose from time to time, and to call forth compliments from Ed was an inspiration to him.

"Well, since you seem so fond of cross-country flying, we'll give you a good chance at it tomorrow. I have to go over to the Edgebrook Club tomorrow anyway, and you'll take the stick all the way over and all the way back.

"It's about 110 miles and it will give you some good experience in making landings and take-offs in strange fields. That Edgebrook field is none too classy—something like a washboard with moth holes in it—and it will give you good experience.

"This means that you had better get out that little book on aerial navigation that you studied in the ground school and give it the once over to refresh your memory.

"However, business before pleasure, so I'll give you another chance to iron out those little kinks in that first solo. Just take the crate and do all that stuff over—minus the flops."

"What! Am I to take-off again right away?" asked Bob.

"You bet. Nobody around here is allowed to get cold on one solo flight—mark that," commanded Ed, "so you just get right down again in your little armchair and go all over the performance again. If you don't, you will find that it will be twice as hard to pull yourself together tomorrow morning.

"If you've had trouble of any sort you don't improve things by quitting. Go to it now, and this time I'm going to be a whole lot more critical. Your turns were very good last time, but see if you can't make them a little more snappy and regular. And again, take that landing line over at the west fence."

This time the take-off was normal, the engine was throttled down to a climbing rate comparable with the former flights and at 1,000 feet Bob leveled off again. Three regular turns of about one mile in diameter were followed by three short, very steeply banked turns that drew forth the approval of Ed as he watched the maneuvers from the ground.

Then followed the landing glide and eventually the landing. It was not perfect, but it was made at the first trial and exceptionally good for a second solo landing. A few more solos and, with reasonable care, Bob will be pulling three-points regularly.

In our next lesson instruction will be based upon the cross-country flight that Ed promised to Bob, the preparations necessary for the flight and, most of all, the method of using the compass and making allowance for drift and head winds.

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Defying Death in Frozen Alaska

(*Continued from page* 30)

to understand that today had been the first clear day.

"You help us find him? You drive us with dogteams?"

The Eskimo agreed. Under his directions the tribe hitched up two teams of wolfish dogs to toboggan sleds. While they were doing this, Noel Wien looked apprehensively at the lowering sun.

"I can't leave the ship perched on that knoll very long," he said. "The least little wind that comes up will wreck her."

The Assistant District Attorney agreed to stay with him and said to the marshal: "We can only allow you two hours. If you are not back within that time, we will have to fly back to the Coleen and spend the night on one of those lakes where there is some shelter from the wind, and come back for you in the morning."

The marshal nodded, and taking the trapper with him, motioned to the Eskimo drivers that he was ready to start. In spite of the light toboggans, the soft, drifted snow made gruelling work for both men and dogs. When they had gone about three miles, they saw ahead of them a mound under the snow with a streak of smoke coming from it. Nearby were curled up some very worn looking malemutes.

The marshal called out, but received no answer. Then he peered inside the skin hut and saw a heavily bearded man lying on the ground wrapped in caribou hides. He started up, gun in hand. The marshal covered him and he sank back.

"What do you want?" he growled. But a glimpse of the stern-faced trapper behind the officer silenced him.

"Get your things on," said the marshal. "There isn't a minute to spare."

"I'm sick."

"Here, I'll help you."

They found that the man's illness was far from being feigned. He had attempted living all winter on the straight meat diet of the primitive Eskimo, with the result that he was a mental and physical wreck. His dogs also were sick and could not have taken him much further. He would have perished half way through the pass.

It was growing dark. The marshal looked at his watch and saw that the time was already up. He hurriedly turned the prisoner's dogs loose and helped him on a sled. Any moment now he expected to see the great monoplane soaring overhead. He was not keen on being left behind in this wild land. He knew there might not be another clear day for weeks and he doubted if Wien could ever find the place again. He motioned to the drivers to hurry up their teams. They lashed the struggling dogs onward.

They were nearing the village, when they heard the ominous whine and roar of the plane. The marshal jumped off his sled and floundered through the snow, wildly brandishing his arms and shouting.

Wien saw them. He had just decided to give them twenty minutes longer, when he caught sight of the long, dark dogteams winding down over a snowfield. He kept the engine going while the natives drove their teams to within a few yards of the plane, refusing to come any closer.

The prisoner was carried the rest of the way and lifted into the cabin. Then Wien taxied through the soft, deep snow. His passengers braced themselves tensely. Would he strike a hidden rock? Could he ever attain sufficient speed to rise? If it had not been down an incline, probably he never would have made it. But as it was, the ponderous monoplane took to the air readily from half way down the knoll safely bound for Fort Yukon.

I Attempt to Break the Record

(*Continued from page* 35)

As I fell I caught a last glimpse of my disappearing plane. I waited until I had fallen about 300 feet before I pulled the rip cord. It seemed that there was a strong wind, blowing about 30 miles per hour. It was a strange feeling, floating earthward with sleet and snow whipping about me. The storm completely obscured my vision. Being unable to see the ground, there was hardly any sensation of descending; it seemed like I was in another world. There was practically no oscillation of the parachute, so except for the intense cold I experienced no discomfort in the descent.

For six or seven minutes I descended, keeping my eyes downward looking for a rift in the storm. Suddenly the mountain top appeared under me, apparently about 300 feet below. As I came nearer to earth I was gladdened by the sight of some telephone wires. They made me feel that I was near to civilization, or at least had something to guide me to habitation. I bent my knees preparatory to landing. The impact with the earth gave me a slight bump, but I was unhurt.

The canopy of the parachute stretched itself out on the bushes and ground. I unbuckled my harness and attempted to gather up the 'chute, but it was wet and too heavy to be carried about in my hunt for a farm house or community. It is a curious affection that one forms for some inanimate object; the parachute had only a few minutes part to play in my life, but it was an important part, so I disliked leaving it there on the ground almost as much as I had disliked jumping from my plane.

Using the telephone wires as my guide, I started walking down the mountainside. Reaching presently a road, I came upon a man who asked if I was the fellow he had heard flying around in the storm. He was a welcome sight to me, doubly so when he told me that about a quarter of a mile away was a ranch. I had landed in Pine Valley, he said, and there were a group of houses and stores, forming a mountain resort, six miles away.

The ranch turned out to be the home of Mr. Garretson Dulin. He invited me in for Thanksgiving dinner with his family. After a hot bath and a change to dry clothes, loaned me by Mr. Dulin, I enjoyed the dinner no less for my experience. That was a Thanksgiving Day dinner that had real significance for me.

Mr. Dulin drove me to Lindbergh Field in San Diego, where I was told that when I failed to show up on schedule time Doug Kelley, Superintendent of Airtech School of Aviation, flew to the mountains to look for me. But he was turned back by the same storm that I had suddenly found surrounding me over the Lagunas.

We retrieved my parachute the next day, but it was three days before my wrecked plane was sighted by an Airtech student who had tramped over the mountains in his search. The plane fell about two miles from the place where I had reached ground safely with my parachute. It was a total loss. I removed the altimeter from the shattered instrument board, to take back to Toledo as a souvenir.

I am disappointed—no one knows how much—in the outcome of my flight. My regrets are increased because of the nearness of my goal when I bailed out. But I never will feel that the possible honors of a transcontinental flight are worth ignoring the rule of safety. I carried a parachute to use in an emergency; the emergency arose, so I used it. That is all there is to it. I would do it again, should a similar occasion occur, and be glad of the chance to live to tell the tale.

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The Rescue of the Lost Battalion

(*Continued from page* 10)

lower and cast the packages still nearer the designated spot. That was contempt of danger for you!

BY THIS time the visibility was greatly improved, so Goettler and Bleckley had enemy aircraft to worry about in addition to ground fire. While they patrolled up and down near the lines to satisfy themselves that there were no Fokkers about, the Archies got their range.

Each minute the Americans stayed the shells grew thicker and burst closer. Gliding down sharply as if they were going home, Goettler suddenly reversed his plane and came roaring back towards the Lost Battalion scarcely a hundred feet above them!

As Bleckley leaned over to survey the ground, every rifle and machine gun within range turned loose on him. For a moment the enemy forgot all else. This lone plane over them signified what they hated and wanted to overcome, and at it they hurled thousands of bullets with all the skill they had.

Goettler skidded his plane, he made startling turns, he side-slipped a little occasionally, he climbed and he dived. Each time the plane turned and its great mottled belly flopped back into normal position, the men of the Lost Battalion groaned and expected to see it tumble from the sky.

But on its way it went like a charmed thing, roaring up and down and across, rocked occasionally by the wash of big shells that had just passed. Just once Bleckley poured a burst of lead into a German machine gun nest he spotted. The rest of the time he was peering intently at the ground, hoping to get some sure indication of the position of Whittlesey's men.

All day the latter had lain there in their holes, watching bundle after bundle of food and supplies drop just below them, barely out of reach. Starved as they were, they dared not show themselves even now.

But they hoped that Goettler and Bleckley would see them, and they hoped equally that the big De Haviland would come through unharmed.

When Goettler and Bleckley had flown up and down thus what seemed an incredible time to all onlookers, suddenly the plane lurched and started down. It was a perfect target now and, as it sank rapidly, a hail of bullets followed it.

Clearing the ridge but skidding in uncertain lines, fired at constantly as long as it remained aloft, the plane finally crashed on the French sector, west of the American army. A bullet had killed Goettler in the air, and Bleckley was mortally wounded.

The courage and persistence that led the airmen to fly into the face of what they knew was almost certain death caused the War Department to award them the Distinguished Service Cross posthumously. In 1922 this award was raised to the Congressional Medal of Honor.

Frank Luke Jr., Goettler, Bleckley and, more recently, Edward Rickenbacker were the only aviators to be awarded the Congressional Medal of Honor for feats during the War.

THE last flight of the day was made by Lieutenant Maurice Graham, pilot, and Lieutenant James McCurdy, observer. Exposed to the same hell of machine gun and rifle fire that had already sent three American planes down, they flew over the ravine at a low altitude.

Just as McCurdy prepared to throw a basket of carrier pigeons on the position which he thought the Lost Battalion occupied, a number of soldiers ran from a dugout and fired at his plane.

"What the hell!" yelled McCurdy. "Let's dive on those snipers and find out what's what."

Ignoring the danger, he and Graham swooped down to investigate. They soon found that the soldiers shooting at them were Germans and that the territory presumably held by the Lost Battalion was in enemy hands!

Dazed by this discovery, the two flyers circled the vicinity and then turned their battered plane homeward

BARGAIN COUNTER

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In order to clear the shelves for the new books that are constantly coming off the press, POPULAR AVIATION is offering a 10% discount off list price on the following books. A check for the necessary amount should accompany each order. POPULAR AVIATION will pay the postage charges.

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only after McCurdy had received a painful wound in the neck.

Their discovery was the most important of the day. We now knew definitely that the ground represented by the coordinates Whittlesey had sent back was in German possession. Were we to assume that some error in location had been made? Or were we to assume that the Germans had killed or captured all members of the Lost Battalion?

This brings us to one of the most dramatic incidents of the battle of the Argonne. A small detachment of nine men became separated from the main body of the Lost Battalion. The Germans killed or captured all of them. Among the captured was Private Crowell R. Hollingshead.

The next day a soldier with a white flag in his hand was seen approaching the Lost Battalion. It was Private Hollingshead, who had the following message for Major Whittlesey:

To the Commanding Officer, Second Battalion, Three Hundred and Eighth Infantry, Seventy-seventh American Division:

Sir—The bearer of this present, Private Crowell R. Hollingshead, has been taken prisoner by us. He refused to give the German Intelligence Officer any answer to his questions and is quite an honorable fellow, doing honor to his fatherland in the strictest sense of the word.

He has been charged against his will, believing he is doing wrong to his country, to carry forward this present letter to the officer in charge of the Second Battalion, Three Hundred and Eighth Infantry of the Seventy-seventh Division, with the purpose to recommend this commander to surrender with his forces, as it would be quite useless to resist any more in view of the present conditions.

The suffering of your wounded men can be heard over here in the German lines and we are appealing to your human sentiments.

A white flag shown by one of your men will tell us that you agree with these conditions.

Please treat Private Hollingshead as an honorable man. He is quite a soldier. We envy him.

(Signed)

The German Commanding Officer.

We shall never know what passed through Major Whittlesey's mind as he read the message. His men were so starved that they even ate tobacco and roots. Many of them were badly wounded. Their ammunition was nearly gone.

Nevertheless the note bore no fruit for the Germans. After reading it the Americans became more defiant than ever. That same afternoon they repulsed two German attacks and inflicted heavy losses on the enemy.

Critics have often wondered why the Lost Battalion didn't fight its way through the detachment of German troops in their rear and thus rejoin the main body of the American army. Here's the answer. Because Major Whittlesey would not leave the wounded.

On October 7 the visibility was very poor again, but in spite of this the 50th Squadron concentrated on the task of finding the Lost Battalion. With McCurdy's discovery to guide them, Lieutenant Robert M. Anderson, pilot, and Lieutenant Woodville J. Rogers, observer, again took up the search.

The enemy fire from the ground was intense, but the Americans stuck grimly to their task. They circled at 300 feet and dropped to 200. Finally they came down to the tree tops.

The air was full of red hot lead. Bullet after bullet crashed into the De Haviland—through the tail, through the wings and into the fuselage. No plane could ride through such a hail of lead for long. The two Americans knew it only too well. But they very courageously risked everything, and Rogers finally spotted a battalion panel and two small infantry panels a short distance from the position which Major Whittlesey had given as the location of his troops.

At last the Lost Battalion had been found! With great daring Rogers and Anderson circled over the suffering men for a few moments and then sped to division headquarters to report their discovery.

Rogers' report is preserved in the files at Washington. Here is a copy of what he wrote:

Departure, 10:30. *Return,* 12:25. *Day,* 7. *Month,* 10. *Year,* 1918.

Mission: Infantry Contact Patrol.

Area Covered: Binarville and Apremont.

Pilot: Lieut. R. M. Anderson. Observer: Lieut. W. J. Rogers.

Altitude 500 *m. Visibility fair. Sq'd. No.* 50.

Called for line twice: Saw battalion panel and two small infantry panels at 09-03 (94.9-76.3) *at* 11:30 *hr.*

Fire at A9-L3 at 11:35.

Quiet in North Argonne Forest.

(Signed) W. J. Rogers.

By comparing the map coordinates that Whittlesey sent back by pigeon (294.6-276.3 or 276.4) with those that Rogers used (94.9-76.3) the difference in position may be seen. A very small difference but one that, under the circumstances, brought great suffering to the surrounded men.

A few hours after their real location became known the Lost Battalion was rescued by the 28th, 82nd and 77th Divisions. Of the 600 men who were cut off with Whittlesey less than 200 were able to walk. Those who survived the terrible ordeal owe their lives to Rogers and Anderson.

Major Whittlesey was awarded the Congressional Medal of Honor for his heroic stand. However, he never fully recovered from the shock of his experiences, and he committed suicide on November 29, 1921, by jumping overboard from a steamship en route from New York to Havana.

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Reader's Experience

(*Continued from page* 40)

a lake in front of us, about a twenty-mile wind and four cylinders that might or might not give us sufficient control to make a turn.

What would you do? Well, I chose trying to get back on the field rather than taking the chance of drowning my passenger—not to mention myself!!—and I swung her around, hoping against hope that the four cylinders would give us enough flying speed to keep under control.

Of course we never did come out of the bank. Just side slipped in as nice as could be—but with what a crash!—hitting first on the left wing (which absorbed the shocks which might otherwise have knocked us out) and then went up on the nose and over on our back. To the fact that we both had our safety belts on we both owe if not our lives at least a couple of limbs.

And, believe it or not, the very next time I went up, which was a week later when trying out our *new* Kitty Hawk, I forgot to fasten my belt and didn't notice it till I went to get out!

I know the rule book says, "Never try to turn back when your motor quits on the take-off," but there are circumstances and then again there are circumstances!

Another experience I had with this same ship last summer was to take a fellow up for his first parachute jump. We sure were a green pair. He had never jumped before and I had never taken anyone up for a jump, but we both had a pretty good idea of how it should be done.

I can still remember it very distinctly: He climbed out on the left wind and stood there a few seconds with a grim look on his face. Then he took a quick glance down and looked over at me with one of those nervous little movements of the mouth which are meant to be smiles but which in such circumstances rarely succeed as such.

I cut the throttle down to about 900 r. p. m. and pulled the nose up slightly, waiting for his signal. He took one more little peek over and then gave me the signal. Just as I kicked rudder over he went, head first.

He cleared beautifully and didn't delay very long in pulling the rip cord. I think I must have lost about a year's growth as I circled around over him watching him drop to earth.

First it looked as if he would land square in the middle of the field, but no! he was overshooting and must certainly land in those telephone wires—no, he's clearing those and coming down in the center of the village. Yes, right on top of Bristol's house; that is, the 'chute caught on top of the house and our would-be Bushmeyer swung in and hit the side of the house a terrific smack!

Had he not been built like an ox he probably would have been hurt rather badly. As it was he limped around for over two weeks.

An Airy Chat with the Editor

(*Continued from page* 6)

vented from building a Heath Parasol because the Pennsylvania State law requires all planes to carry Department of Commerce license.

Home-built planes are not ordinarily eligible for an "NC" license and can only be identified, which is not sufficient in Pennsylvania and possibly in some other States also.

We took this matter up with the Heath Aircraft Corp. Their recommendation was that in cases of this kind the home builder is a manufacturer in the legal sense and may apply for an experimental "X" license under his own name.

Thus Mr. Metzner can easily secure from the Department of Commerce an "X" license for the "Metzner Parasol," and Mr. Smith could license a duplicate plane as the "Smith Parasol."

The States are then automatically required to license any plane which carries the Department of Commerce license.

Thus the difficulty is solved.

* * *

C. A. ARMS of North Canton, Ohio, makes one of the finest suggestions we've heard of for a long time. But read his letter:

"After reading of Mr. Ed. Heath's death I started thinking of what he has done to promote private flying. Having read his articles in this magazine for the past few months I had thought:

"Just to show their appreciation of Heath's work in aviation, all of us enthusiasts ought to contribute about 25c each and buy a silver Heath Parasol or a plate with an appropriate citation engraved on it.

"The readers of POPULAR AVIATION especially should do this because Ed. was nice enough to write up the articles on 'How to Build the Heath Parasol.' Then on the 'Heath Memorial' could be engraved: 'From the readers of POPULAR AVIATION.'

"Enclosed you will find my 25c to start the ball rolling for the 'Heath Memorial Fund.'

"If you run this in the 'Airy Chat' column and word it out right I think you'll put it across."

There's Mr. Arm's suggestion just as he made it and if we wrote all night we couldn't improve on it.

We know that you readers will welcome this opportunity to express your appreciation of the fine work and character of Ed. Heath, and POPULAR AVIATION gladly assumes the responsibility of acting as trustee of the fund until such time as a suitable memorial can be purchased.

Contributions of any size will be most welcome. We will keep a list of all contributor's names which will accompany the memorial at the time of its presentation. Any letters of appreciation will also be presented with the memorial.

Address all contributions to: The Heath Memorial Fund, c/o POPULAR AVIATION, 608 S. Dearborn St., Chicago, Ill.

* * *

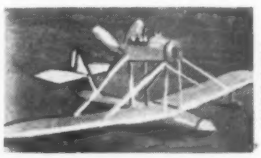
HOWARD PECK, of Chicago, sent us this photograph of an unusual model. He writes:

"If you remember, in the March issue of POPULAR AVIATION you published a picture of the newest Italian Savoia fighting plane. The model I built is as near like the original as your description gave.

"It has semi-cantilever tapered wings, a 'V' shaped hull, and a miniature water cooled engine. If you look closely at the picture you will notice the exhausts on the miniature engine.

"The hull, nose, and four bladed prop are marine blue. The sides, rudder, nacelle and struts are white. The top of the boat, wings and stabilizer are silver. All other coloring is of lacquer. The wing floats are silver and white.

"I have never really flown it for duration, mainly because of the weather and lack of a pond. I have made short hand launched flights, however, in the basement.



Howard Peck built this model from a picture of the latest Italian fighter

"It has a 24-inch wing spread and weighs about three ounces. The weight of the plane is due to the lacquering and wood veneer hull."

Pretty clever model, if you should ask us.

* * *

IF Mr. H. G. Hecketsweiler, last heard of in Chicago, and Mr. Chas. A. Sloane, supposedly of Tallahassee, Fla., will send their present address to POPULAR AVIATION, they will be rewarded by receiving a check apiece.

Frank T. Roberts has been building models for four years. He wants to build models to order and will welcome inquiries addressed to him at Jamesburg, N. J.

Joseph Del Tin, 5033 Parker Ave., Detroit, Mich., is building a Rhön Ranger. He would like to hear from other glider fans.

Gordon Giles, of Windsor, Nova Scotia, is only 15 years old but he has built the first glider in Nova Scotia. He used P. A. Rhon Ranger plans and completed the glider for less than $35.00.

* * *

WELL, the space is getting short so we'll have to dive through a bunch of letters in a hurry.

We've got some kicks here. Yes, sir, E. E. Williams of Denver is sore at us because every time he goes to buy the latest P. A. he finds that it's sold out. He has to run around so much to find an unsold copy that he's mad

and is thinking of suing us for wasted carfare.

And there are a lot of bozos who are threatening to wreck our good looks because we insist on putting the back cover right after page 66 when they think it belongs after page 266.

Now, *those* are what I would call high class kicks.

* * *

BILLY METZGER of 1440 Clarence Ave., Lakewood, Ohio, sent us two knockout drawings that he made. One was a Curtiss Hawk and the other a Spad—both in action above the clouds.

He says in his letter:

"I have been sick in bed for seven months and every month I get your magazine. I like the Model Department as I make planes to help pass away the time, that is, when I'm able."

Perhaps Billy would like to hear from some of you other model builders.

* * *

HAROLD NUSBAUM of Washington, D. C., built this model De Haviland. It was so successful that he was never able to take a picture of it in flight. It flew too fast for his camera.

So here it is on the sidewalk posing for its picture. Harold writes that it

This DH-4 is an excellent flying model and a good copy of the original plane

has a span of 3 ft. and a length of 2 ft., 9 in. It will take off in less than 2 feet and he has timed it for 1 minute and 3 seconds over a distance of 500 feet.

* * *

NORVELL CLARKSON of Macon, Mo., whites a very interesting letter:

"It seems to me that all the commercial sailplanes are too heavy. From what I have been able to find out they weigh from two hundred and fifty on up and have a wing span of from thirty to sixty feet.

"The plane I have designed and built has not yet been put to any very rigid tests. It has a wing span of fifty-six feet. Floating ailerons. One single box spar seven by nine inches, built up of spruce stringers and plywood sides. The wing is the eliptical type, chord four feet in the middle tapering to sixteen inches at the tip.

"The fuselage is fourteen feet long and of triangle form and stressed up for a light motor if wanted.

"The tail surfaces are two by ten feet for the elevator and three by five for the rudder. These are both balanced so that no load is placed on them.

"This plane weighs only approximately one hundred thirty pounds. I weigh only one hundred twenty-three, so this makes the total only two fifty-three.

"The wing is placed on the bottom of the fuselage and has no bracing, either on the outside or on the in. I know this sounds funny but the strength lies in the box spar.

"I have not flown this plane very many times, having just completed it. The weather and land conditions have not been very favorable around here this winter, but the gliding angle seems to be about seventeen to one."

From the description of the sailplane, I should say it's a humdinger.

* * *

DAN HOFMANN of Iliff, Logan County, Colo., would like to hear from lightplane or glider owners who have had flying or building experience.

A mysterious correspondent writes:

"A Canadian wishes to know of anyone having a lightplane for sale, or even parts for the Heath Parasol. Address J. M. M. R., 12116 80th St., Edmonton, Alberta."

OKMNX—There's your announcement, J. M. M. R.!

John M. O'Leary of 122 Dix Ave., Glens Falls, N. Y., has about $400 to spend on a lightplane—two place preferred, but will consider a single seater.

* * *

We have a lot more letters, but it doesn't seem that we have room for any more.—Well, maybe just one more. This is from Rochester, New York.

"I am an ardent reader of POPULAR AVIATION and enjoy it immensely. The Model Department is the most fascinating section of your magazine to me. I am just as interested in aviation as any young man or woman of this era. I have made several different models and am sure going to make the 'Travel-air Mystery Plane.'

"Yours in aviation,

"Catherine A. Confarotta."

What do you think of *that*, you model builders?

I think that Catherine should send us a picture of herself holding her model to prove that she's as good a builder as any of you fellows. How about it, Catherine?

And incidentally, if any of you model fans have pictures of your pet models—send them in to us. Maybe we'll publish some of them.

* * *

WELL, as I started to say, we have lots of letters, but no more room. So all of you whose names were not mentioned this month, don't be downhearted. There are 500 of you in the same boat.

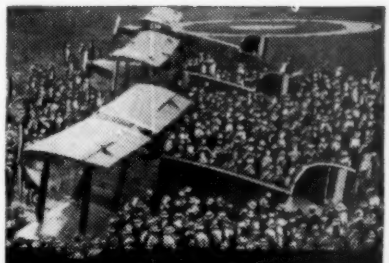
But every one of your letters was read and appreciated and we hope that you'll write in to us as often as you feel the urge.

We've got some swell stuff lined up for next issue, so until then—cheerio!

—D. E. M.

READERS

POPULAR AVIATION will be very glad to forward letters from readers direct to any aircraft manufacturer. Perhaps you were especially interested in a particular lightplane, model or glider described in this issue. Merely write a letter addressed to the manufacturer whose product interested you, asking for further particulars, send it to POPULAR AVIATION, and it will be promptly forwarded.



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